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PLANT STUDIES

ADVERTISEMENT

The United States National Herbarium, which was founded by the Smithsonian Institution, was transferred in the year 1868 to the Department of Agriculture and continued to be maintained by that department until July 1, 1896, when it was returned to the official custody of the Smithsonian Institution. The Department of Agriculture, however, continued to publish the series of botanical reports entitled "Contributions from the United States National Herbarium," which it had begun in the year 1890, until, on July 1, 1902, the National Museum, in pursuance of an act of Congress, assumed responsibility for the publication. The first seven volumes of the series were issued by the Department of Agriculture.

ALEXANDER WETMORE,
Assistant Secretary, Smithsonian Institution.

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SMITHSONIAN INSTITUTION
UNITED STATES NATIONAL MUSEUM

CONTRIBUTIONS

FROM THE

UNITED STATES NATIONAL HERBARIUM

VOLUME 24

PLANT STUDIES
CHIEFLY TROPICAL AMERICAN

BLAKE, MAXON, NILES, CHASE
POPENOE, and HITCHCOCK

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NOTE

Volume 24 of the Contributions consists of 9 parts, which were issued as follows:

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Part 3, pages 65 to 86, August 11, 1922.
Part 4, pages 87 to 100, August 18, 1922.
Part 5, pages 101 to 134, May 28, 1924.
Part 6, pages 135 to 214, August 20, 1925.
Part 7, pages 215 to 290, November 20, 1925.
Part 8, pages 291 to 556, May 4, 1927.
Part 9, pages 557 to 762, February 12, 1930.

PREFACE

Volume 24 of the Contributions consists of nine parts. The first is a paper by Dr. S. F. Blake, of the Bureau of Plant Industry, United States Department of Agriculture, containing descriptions of 46 new species of flowering plants from eastern Guatemala and Honduras. The collection of which these new species form a part was made during the spring of 1919 by several members of an economic survey mission sent out by the United States Department of State, to which Prof. Henry Pittier, Dr. S. F. Blake, and G. B. Gilbert, of the Bureau of Plant Industry, were attached as botanists.

Part 2, by Dr. William R. Maxon, associate curator of the National Herbarium, deals with tropical American ferns and is the seventh of a series begun in volume 10 of the Contributions. Of special interest are the revision of a difficult subgroup of tree ferns of the genus *Alsophila*, and the description of a curious new genus of dryopteroid ferns from the West Indies, *Atalopteris*.

The third part consists of a revision of the genus *Diplostephium*, by Dr. S. F. Blake, prepared in connection with his studies of the collections made by Prof. Henry Pittier in South America. *Diplostephium* is a genus of the family Asteraceae related to *Aster*, but distinguished by its shrubby habit in addition to technical characters. Forty-one species are recognized, of which 13 are described as new. Since several of the species previously described are not represented in the herbaria of this country, the revision has been limited to a key, with descriptions of the new species and notes on the diagnostic characters of the others. The work is based on material in the Gray Herbarium and the herbarium of the New York Botanical Garden, in addition to that in the United States National Herbarium.

Part 4, also by Doctor Blake, is entitled "Native Names and Uses of Some Plants of Eastern Guatemala and Honduras," and is a summary of information obtained by the botanists who accompanied the Economic Survey Mission sent out by the Department of State in the early part of 1919, as mentioned above. The time spent in the field by the expedition was so short that the list is necessarily incomplete, but it contains much new and useful information, especially on the wild medicinal plants, and should be of service to travelers who may visit the same region.

The fifth part, by Wilson Popenoe, agricultural explorer of the United States Department of Agriculture, is entitled, "Economic

Fruit-bearing Plants of Ecuador," a region rich in new or little known plants the fruits of which are of economic value. It was prepared as a result of eight months field work, during which a special effort was made to obtain data concerning the distribution, common names, and uses of all cultivated fruit-bearing plants, as well as of wild ones the fruits of which are utilized by Ecuadorians. Except for a few popular and fragmentary accounts, practically nothing has been published previously on the subject, and even the nomenclature of some of the species included in the present paper has been generally confused. The paucity of published knowledge concerning the economic botany of northern South America is well known, and it is believed the present contribution materially increases the available information on an important subject. Numerous species herein discussed have been introduced recently into the United States, where they are under test by horticulturists throughout those regions to which they seem likely to prove adaptable.

Part 6 is a bibliographic study of Beauvois' "Agrostographie," by Cornelia D. Niles, with introduction and botanical notes by Mrs. Agnes Chase. This 256-page book on grasses, published by Palisot de Beauvois in 1812 under the title Essai d'une Nouvelle Agrostographie, has been a source of confusion to botanists for more than a hundred years. Beauvois rendered an important service to science by introducing into the study of grasses the use of many important characters that had not previously been utilized in the classification of these plants, but in applying his new method to the grasses known at that time, more than 2,000 species, his work was often very careless. The application of many of his new names and binomials is obscure, and they have been differently interpreted by different writers. Beauvois proposed in this book many new genera and more than 600 new binomials. The correct identification of these genera and species is of fundamental importance to the study of grasses in all parts of the world. In the accompanying paper Miss Cornelia D. Niles and Mrs. Agnes Chase, Bureau of Plant Industry, United States Department of Agriculture, present the results of a long and painstaking study of Beauvois' book. All his genera and most of his species are represented in the United States National Herbarium. A type is indicated for each genus and species, the reason for the choice being given in each instance. The genera have been identified, and all but a small number of the species. This information has been of great assistance in the grass studies carried on at the National Herbarium and it is believed that its publication will be of similar value to students of grasses elsewhere.

Part 7 consists of two papers upon *Stipa*, one of the larger genera of the grass family, by Prof. A. S. Hitchcock, botanist in charge of systematic agrostology, United States Department of Agriculture.

The species of this genus are found throughout the temperate regions of the world and are especially characteristic of steppes, plains, deserts, and other arid and semiarid regions. They form an important part of the forage of the western plains and foothills of the United States. The first paper is a revision of the North American species, of which there are 40. Five of these are described as new.

The second paper is a synopsis of the South American species of *Stipa* represented in the United States National Herbarium. Unfortunately the material at hand is not sufficient to warrant a complete revision at this time. There are included 89 species, 19 of which are described as new.

Part 8, also by Professor Hitchcock, is an account of the grasses of the central Andes, including the three countries, Ecuador, Peru, and Bolivia. Most of the region is mountainous, the Andes traversing it from north to south. Though lying under the Equator, much of the region is at so high an elevation that many ranges and peaks are capped with perpetual snow. The flora is mainly temperate and alpine, but it becomes tropical on the coastal plain and on the eastern slope, where the mountains merge into the Amazon Basin. There are wide differences in the amount of rainfall. The base of the eastern slope lies in the humid tropical forest, while the coastal region of Peru is one of the driest regions of the world. Because of the extremes of altitude and precipitation the grass flora is large and varied. The present paper includes 124 genera and 605 species, of which 29 species are new.

The ninth and concluding part of the volume is a paper of similar scope by Professor Hitchcock dealing with the grasses of Central America. As here understood, Central America embraces the area between Colombia and Mexico. This territory, which includes Panama, lies entirely within the Tropics and except for the summits of the high mountain peaks the flora is tropical. The flora of the lowland along the Atlantic coast is similar to that of the other American tropical lowlands bordering the Atlantic Ocean. Although the climate of the elevated regions of the interior is temperate, the grasses found there are, with few exceptions, those confined to Mexico, Central America, and Colombia. The higher peaks reach an altitude of more than 4,200 meters, but are not high enough to support an alpine flora. The present paper includes 115 genera and 460 species.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

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UNITED STATES NATIONAL MUSEUM

CONTRIBUTIONS

FROM THE

UNITED STATES NATIONAL HERBARIUM

VOLUME 24, PART 1

NEW PLANTS FROM GUATEMALA AND HONDURAS

By S. F. BLAKE

WASHINGTON
GOVERNMENT PRINTING OFFICE
1922

BULLETIN OF THE UNITED STATES NATIONAL MUSEUM.

II

PREFACE.

The present paper by Dr. S. F. Blake, of the Bureau of Plant Industry, United States Department of Agriculture, contains descriptions of forty-six new species of flowering plants from eastern Guatemala and Honduras. The collection of which these new species form a part was made during the spring of 1919 by several members of an Economic Survey Mission sent out by the United States Department of State, to which Prof. Henry Pittier, Dr. S. F. Blake, and Mr. G. B. Gilbert, of the Bureau of Plant Industry, were attached as botanists. A paper containing notes on the uses and native names of the plants collected on this expedition is in process of preparation.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

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NEW PLANTS FROM GUATEMALA AND HONDURAS.

By S. F. Blake.

INTRODUCTION.

In the spring of 1919 an Economic Survey Mission, headed by the late Major Percy H. Ashmead, was sent out by the United States Department of State to make a general survey of the natural conditions and resources of the region lying between the Motagua Valley in Guatemala and the Chamelecón Valley in Honduras. The botanical collections on which the present paper is based, amounting to about 810 numbers, were made by Henry Pittier, G. B. Gilbert, and S. F. Blake, of the United States Department of Agriculture, and also by Dr. H. N. Whitford and Mr. L. R. Stadtmiller, who were attached to the expedition as foresters. A considerable part of Mr. Pittier's Honduran collection was unfortunately lost in transit to Washington.

The period of our work, May 2 to June 4, 1919, fell within the end of an unusually extended dry season, to which was due the fact that we were able to follow some of the mountain trails which in wet weather become nearly or quite impassable. Mr. Pittier's collections were made chiefly on the main trail leading from Los Amates, Department of Izabal, Guatemala, through the Moljá Valley to El Paraíso and La Florida, Department of Copán, Honduras, thence back through the Espíritu Santo Mountains and the valleys of the Mojanales and Tepemechín rivers to Morales in Guatemala, with later collections at Quiriguá and Quebradas, Guatemala. He was accompanied by Mr. Gilbert, Dr. Whitford, and Mr. Stadtmiller. The specimens collected by Dr. Whitford and Mr. Stadtmiller were chiefly from El Lancetillal and Macuelizo, Honduras. The writer later followed the same trail from Los Amates through El Paraíso and La Florida to Quebradas, and in addition collected around Los Amates, at Gualán, and on a trip made in company with Mr. Stadtmiller and Mr. H. H. Bennett from Los Amates over the Sierra de las Minas to Izabal.

The vascular cryptogams collected have been determined by Mr. William R. Maxon, the grasses by Prof. A. S. Hitchcock and Mrs. Agnes Chase, the Nyctaginaceae, Amaranthaceae, and Rubiaceae by

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Mr. Paul C. Standley, and the Eupatorieae by Dr. B. L. Robinson, who has described a new species of *Eupatorium* collected on this expedition. The remainder have been determined by the writer, with the exception of a few species named by Mr. Pittier, who has already published a paper[1] describing a chicle-yielding species of *Achras* which he collected.

CYPERACEAE.

Fuirena bulbipes Blake, sp. nov.

Rootstock creeping, about 2 mm. thick; base of stems bulbous-thickened, about 13 mm. long, 6 mm. thick; stems approximate, erect, 60 to 70 cm. high, about 3 mm. thick below, angulate, striate, the lower internodes hispid-pilose with spreading hairs, the upper glabrous; basal sheaths short, hispid-pilose, nearly or quite bladeless; stem leaves about 4, the hispid-pilose sheaths 2.5 to 4.5 cm. long, the brown pilose-ciliate scarious ligules 2 mm. long, the lance-linear erectish blades flat, 3.5 to 14 cm. long, 5 to 8 mm. wide, about 6-nerved, pale green, rather densely ascending-hispidulous above, spreading-hispid-pilose on margin and on nerves beneath; panicle small, 8 cm. long, slightly branched; spikelets sessile in clusters of 3 to 8, ellipsoid, acutish, 5 to 6 mm. long, 2 mm. thick; scales obovate, pale brown, scarious, ciliate, rounded, about 2 mm. long, the 3 green nerves converging and abruptly produced into a spreading or recurved stiff green mucro 0.2 to 0.7 mm. long; perianth scales 3, about equaling the achene in the dried state, the slender bent stipe about one-third as long as the body, the body obovate-oval, strongly 3-ribbed, papillose-puberulous and ciliolate, membranaceous, about 0.8 mm. long, 0.4 mm. wide, at tip abruptly contracted into a bulbous-thickened blunt appendage about 0.2 mm. long, this provided with a slender incurved hispidulous awn about 0.2 mm. long; achene broadly obovoid-trigonous, pale brown, shiny, short-stiped, about 0.8 mm. long (excluding beak), 0.7 mm. wide, the whitish hispidulous beak about 0.5 mm. long.

Type in the U. S. National Herbarium, no. 989612, collected in dryish ditch along railroad at Cristina, Department of Izabal, Guatemala, May 22, 1919, by S. F. Blake (no. 7578).

With a general resemblance to *F. umbellata* Rottb., this species may be readily distinguished by its perianth scales, which are oval, 3-nerved, bulbous-thickened above, and provided with a minute incurved awn. Those of *F. umbellata* are obovate, emarginate, membranaceous, not apically thickened, and tipped with a comparatively long curving awn.

MORACEAE.

Dorstenia contrajerva tenuiloba Blake, subsp. nov. PLATE 1.

Habit and flowers of the typical form; leaves broadly ovate in outline, 16 cm. long, 15 to 18 cm. wide, deeply pinnatifid, the lobes 7, the middle and upper ones lanceolate, attenuate, 8 to 11 cm. long, 1.5 to 2 cm. wide, about four times as long as the breadth of the blade between them.

Type in the United States National Herbarium, no. 989610, collected in damp woods along trail from Los Amates to Izabal, in the lower region of the Sierra de las Minas, Department of Izabal, Guatemala, May 31, 1919, by S. F. Blake (no. 7803).

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[1] On the origin of chicle with descriptions of two new species of *Achras*, Journ. Washington Acad. Sci. 9: 431. 1919.

From the series of *D. contrajerva* and *D. contrajerva houstoni* L. in the National Herbarium, this plant differs so markedly in leaf form as to merit subspecific separation.

EXPLANATION OF PLATE 1.—*Dorstenia contrajerva tenuiloba,* from the type specimen. One-half natural size.

OLACACEAE.

Heisteria media Blake, sp. nov.

Tree; young branchlets dull olive-green, the older grayish-barked, glabrous; leaves alternate, the blades oval to oblong-elliptic or rarely obovate-oval, 10 to 15 cm. long, 4.5 to 7 cm. wide, abruptly short-pointed with obtuse tip or rarely and abnormally rounded, cuneate at base, pergamentaceous, deep green and slightly shining above, dull beneath, glabrous, the primary veins about 7 pairs, alternate, obscure above, prominulous beneath, forked near the tip and anastomosing near the margin, the secondaries obscure; petioles sulcate, 10 to 15 mm. long; calyx in young fruit 2 to 2.8 cm. wide, coriaceous, glabrous, 5-lobed to middle, the lobes deltoid, obtuse, plicate in the sinus; young fruit ovoid, acutish, 6 mm. long.

Type in the U. S. National Herbarium, no. 989624, collected near Los Ranchos, Department of Copán, Honduras, May 6 or 7, 1919, by H. Pittier (no. 8448).

Heisteria media in its leaf characters comes between *Heisteria acuminata* (Humb. & Bonpl.) Benth. & Hook.[1] and *H. coccinea* Jacq., uniting nearly the texture of the leaf of *H. acuminata* with the obscure venation of *H. coccinea.* It is, however, perfectly distinct from either of these species.

LAURACEAE.

Phoebe ambigens Blake, sp. nov. PLATE 2.

Tree up to 30 meters high and about 1 meter in diameter; branchlets angled, striate, in youth finely strigillose, glabrate; leaves alternate; petioles stout, obscurely puberulous above, glabrate, unmargined, 1.3 to 2.8 cm. long; blades elliptic to oval-oblong, 9.5 to 26 cm. long, 3.5 to 10 cm. wide, obtuse or usually short-pointed with obtuse apex, at base cuneate, pergamentaceous, in youth finely appressed-puberulous especially above along costa, in age glabrous, often tufted in the axils of the veins beneath, elegantly prominulous-reticulate on both sides, the 5 to 7 pairs of lateral veins prominent on both sides, diverging at an angle of about 45°; peduncles axillary toward tips of branches, 5.5 to 7.5 cm. long, obscurely puberulous or glabrous; panicles pyramidal, loose, obtuse, rather few-flowered, 3.5 to 6 cm. long, 4 to 8 cm. wide, finely griseous-puberulous; flowers umbellulate in 3's or 4's at the tips of the ultimate branchlets, the pedicels 4 to 9 mm. long, the bractlets deciduous; perianth 7 mm. long, 15 mm. wide when expanded, the tube short, turbinate, 1 mm. long, the segments broadly oval, broadly rounded at apex, slightly or not at all narrowed at base, 6 to 7 mm. long, 4.8 to 5.5 mm. wide, densely appressed-griseous-puberulous outside, puberulous within; stamens of series I quadrate-oblong, 2.4 mm. long, 1.7 mm. wide, truncate, contracted into a short-pubescent base only 0.4 mm. long, the upper pair of cells directly over the lower; stamens of series II similar, with longer stipe (1 mm. long), the anther 1.8 mm. long, subtruncate; stamens of series III 2.8 mm. long, the anther 1.4 mm. long, truncate, the cells lateral-extrorsely dehiscent, the filament 1.4 mm. long, short-pubescent,

[1] *Heisteria acuminata* Benth. & Hook.; Donn. Smith, Enum. Pl. Guat. 3: 18. 1893; *Rhaptostylum acuminatum* Humb. & Bonpl. Pl. Aequin. 2: 139. *pl. 125.* 1809.

bearing two-fifths its height above its base two whitish subglobose sessile glands essentially as long as itself; pistil 2.2 mm. long, the depressed-globose ovary with a circumferential ring of hairs near middle, the style equaling the ovary; perianth limb decidous, the tube persistent as a shallow cup.

Type in the U. S. National Herbarium, no. 989623, collected in clay soil at Rodezno, Department of Copán, Honduras, at an altitude of about 120 meters, May 3, 1919, by H. N. Whitford and L. R. Stadtmiller (no. 7).

OTHER SPECIMENS EXAMINED:

GUATEMALA: In rich clay, Las Playitas, Department of Izabal, altitude 45 meters, May 13, 1919, *Whitford & Stadtmiller* 32.

This species bears the native names "guambo" (Honduras) and "aguacatillo" (Guatemala). The species is well distinguished by the size of the flowers and the character of the leaves. The wood is used for boards. The nature of the fruit is unfortunately not known.

EXPLANATION OF PLATE 2.—*Phoebe ambigens*, from the type specimen. Natural size.

SILENACEAE.

Drymaria idiopoda Blake, sp. nov.

Prostrate annual, several-stemmed, the stems 10 to 40 cm. long, simple or sparsely branched, very sparsely spreading-pilose; leaf blades broadly ovate or suborbicular-ovate, 4 to 11 mm. long, 4 to 10 mm. wide, abruptly apiculate and slightly cuspidulate at the rounded or obtuse tip, broadly rounded or subtruncate at base, thin, light green, ciliate, glabrous above, sparsely pilose along the costa beneath; petioles 1 to 3 mm. long, pilose-ciliate; pedicels solitary in the upper axils, sparsely spreading-pilose, 10 to 18 mm. long; sepals 5, oblong-ovate, 3 to 4 mm. long, obtuse to acutish, the outer herbaceous, obscurely 3-nerved, pilose-ciliate and sparsely spreading-pilose dorsally, the 2 inner glabrous and with narrow pale margin; petals 5, white, linear-cuneate, 2 to 4-fid, 2 to 4-nerved, equaling or at length exceeding the sepals, persistent; stamens 10, unequal, the 4 longer equaling or somewhat surpassing the pistil; ovary ovoid, obtuse; styles 4, recurved, strongly papillose; capsule equaling the sepals, obtuse, the 4 valves thickened at tip; seeds 23, brownish black, papillose-muricate, 0.6 to 0.8 mm. long.

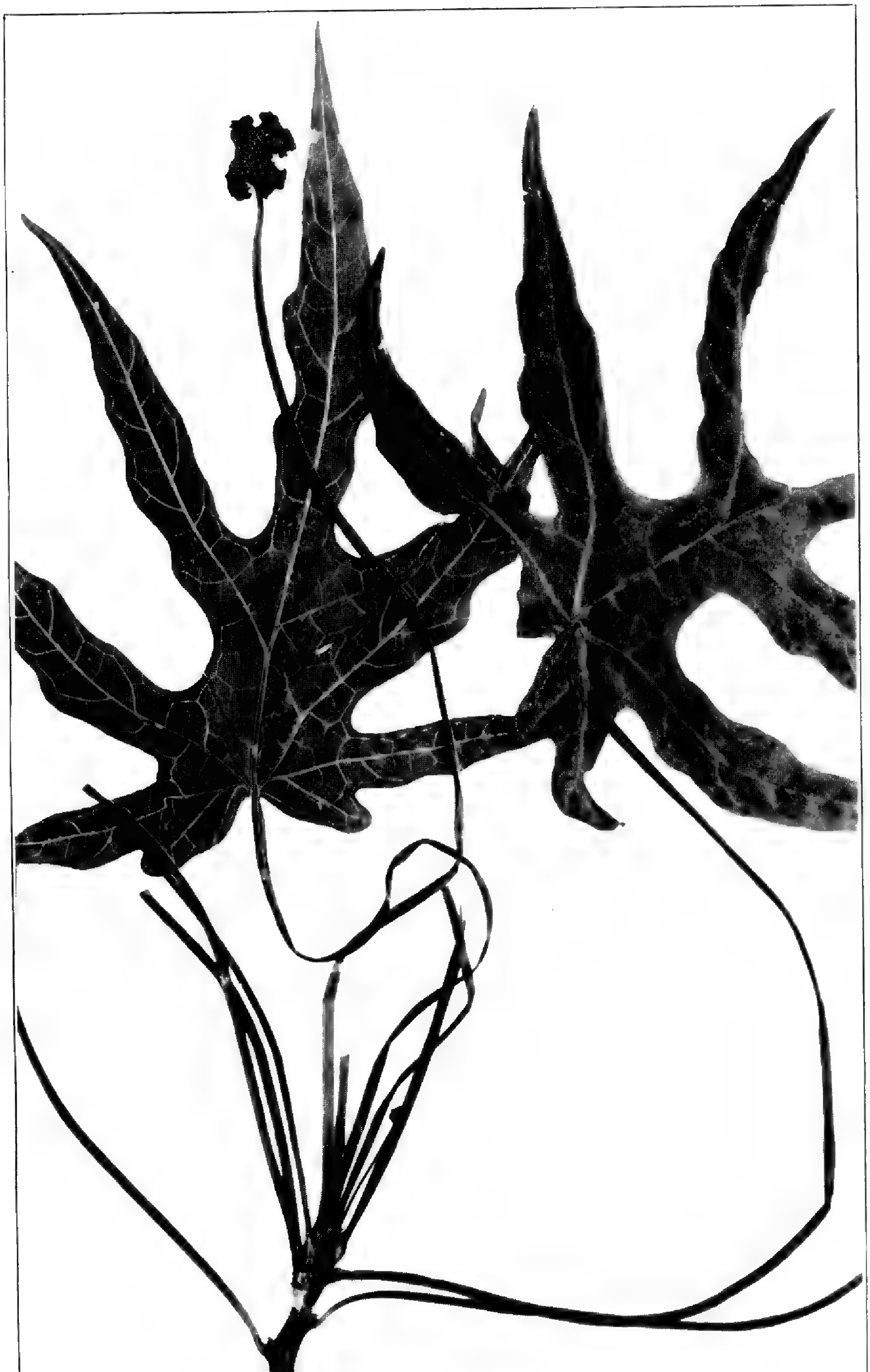
Type in the U. S. National Herbarium, no. 989609, collected along brook at Hacienda La Zumbadora, Department of Copán, Honduras, May 12, 1919, by S. F. Blake (no. 7381).

Drymaria idiopoda belongs to the group of closely related species centering around *D. cordata* (L.) Willd., and is distinguished by its sparse spreading pubescence, ovate (not cordate) leaves, and solitary axillary flowers.

FABACEAE.

Stylosanthes eriocarpa Blake, sp. nov.

Frutescent, ascending, branched, 30 cm. high; young branches olive-green, densely pilose with ascending hairs, the older fuscous, at length gray-barked, subglabrate; stipules pilose, 5.5 to 6 mm. long, the sheath 3 to 4 mm. long, the free tips subulate, subspinescent, 2 to 2.5 mm. long; petioles pilose, the free portion 2 to 2.5 mm. long; leaflets 3, oblong-elliptic to oblong-obovate, 3 to 7.5 mm. long, 1.5 to 2.5 mm. wide, acute at each end, slightly mucronulate, slightly denticulate above, thick, deep green and sparsely short-pilose above, beneath paler, short-pilose, with 3 pairs of prominulous whitish veins; spikes composed of 2 or 3 spikelets; primary bracts pilose, unifoliolate, otherwise



DORSTENIA CONTRAJERVA TENUILOBA BLAKE.

PHOEBE AMBIGENS BLAKE.

similar to the leaflets but smaller; secondary bract 1, scarious, pilose-ciliate, 2.8 mm. long, bifid to middle, the lobes lance-ovate, acute; axis rudiment slender-subulate, pilose-ciliate, shorter than the bract; bractlet 1, similar to the secondary bract but with narrower lobes; calyx 6.5 mm. long (including the 4 mm. long stipelike base), membranaceous, 5-lobed, the 4 upper lobes rounded, ciliate, the lowest lobe the longest, obtuse, ciliate and dorsally pilose; corolla yellow, marked with red on banner, 5 mm. long; banner oval, barely emarginate; lateral petals equaling the keel, rounded; stamens subequal, the alternate ones with longer filaments and very small didymous anthers; pod 8 mm. long, the sterile basal joint densely long-villous, 1.5 mm. long, the fertile joint villous, 3 to 3.5 mm. long, 1-nerved on the sides and loosely reticulate, the villous hooked beak 3 mm. long.

Type in the U. S. National Herbarium, no. 989608, collected on an open rocky hillside along trail from Los Amates to Izabal, Department of Izabal, Guatemala, May 31, 1919, by S. F. Blake (no. 7792).

This species is a member of the section *Stypos anthes*, and is most closely related to *S. hamata* (L.) Taub. (*S. procumbens* Swartz), from which it differs in its shorter stipules and the few-veined pubescent leaflets.

Meibomia albida Blake, sp. nov.

Herb, the stems prostrate, rooting at the nodes, about 1 meter long, green, densely and finely spreading-hirtellous and with sparse longer uncinate hairs, the internodes 2.5 to 14 cm. long; stipules lance-ovate, 6 mm. long, attenuate, deciduous, herbaceous, becoming dry and brownish, striatulate, finely hirtellous, those of the pairs united on one side at base; leaves 3-foliolate; petioles erect, 6 to 9 cm. long, slender, densely and finely spreading-hirtellous, the rachis similar, 3 to 7 mm. long; stipels linear-subulate, striatulate, deciduous, 2.5 mm. long; petiolules densely hirtellous, 2 to 3 mm. long; lateral leaflets ovate, 4 to 6 cm. long, 2 to 3 cm. wide, acuminate, at base broadly rounded, papery, above green, sparsely puberulous, glabrate, beneath glaucescent, densely short-pilose with ascending white hairs, the chief lateral veins about 4 pairs, the secondaries somewhat prominulous-reticulate above, the secondaries and tertiaries densely prominulous-reticulate beneath; terminal leaflet ovate or suboricular-ovate, 4.7 to 7 cm. long, 3 to 4.2 cm. wide, acuminate, at base rounded or cuneate-rounded, otherwise similar to the lateral leaflets; peduncles solitary, axillary, erect, 16 to 22 cm. long, densely spreading-hirtellous and with sparse longer uncinate hairs, bearing about 3 pairs of ovate, acute, striate, mostly deciduous bracts about 4 mm. long; raceme simple, loose, few-flowered, about 7 cm. long in young fruit, like the pedicels uncinate-hirtellous; bracts herbaceous, ovate, 4 mm. long, acuminate, striate, deciduous, finely hirtellous and sparsely ciliate; pedicels mostly in pairs, in flower 5 mm., in fruit 10 mm. long; calyx finely hirtellous and sparsely ascending-pubescent, the ovate entire upper lip 2.7 mm. long (from base of tube), the lower lip subequal, 3-lobed to below the middle, the lobes ovate, acuminate, the middle one longest; corolla white, faintly tinged with pink, 5.5 mm. long, glabrous, densely and finely papillose all over outside, the banner quadrate-orbicular, subemarginate, short-clawed; loment (submature) on an erect, densely uncinate-hirtellous stipe 4 mm. long, 2-jointed, densely uncinate-hirtellous, slightly curved on the upper margin, lobed beyond the middle on the lower, the isthmus broad, not inflexed above, the joints semiorbicular, straight on the dorsal margin, broadly rounded on the lower, 7 mm. long, 4.5 mm. wide, the style 1.8 mm. long in flower, glabrous, deciduous in fruit.

Type in the U. S. National Herbarium, no. 1,037,056, collected in wood path at Quebradas, Department of Izabal, Guatemala, May 19, 1919, by S. F. Blake (no. 7510).

Meibomia albida is readily distinguished from its nearest relative, *M. axillaris* (Swartz) Kuntze, by its ovate acuminate leaflets and white flowers. The description of *M. axillaris* var. *sintenisii* Urban [3] is suggestive of *M. albida*, but I can not believe that the plant above described is only varietally distinct from *M. axillaris*.

Meibomia macrodesma Blake, sp. nov.

Scandent herb; stem slender, green, finely and densely spreading-puberulous and more sparsely or on the young parts densely hispid with ascending or spreading brownish uncinate hairs; leaves alternate, 3-foliolate; stipules decidous, not seen; petioles 2.5 to 5.5 cm. long, the rachis 1.2 to 2.2 cm. long, pubescent like the stem, but the long hairs scarcely hooked; petiolules densely rufescent-hairy, about 2.5 mm. long; stipels linear-subulate, deciduous, about 5 mm. long; lower pair of leaflets obliquely ovate, 3.5 to 7 cm. long, 2 to 3.8 cm. wide, obtuse or acute, apiculate (the apiculation about 1 mm. long), at base broadly rounded, papyraceous, above deep green, evenly but not densely pilose with subappressed brown hairs, densely rufescent-ciliate, beneath paler green and subglaucescent, similarly but more densely and softly pilose, the hairs denser and more rufescent along the prominulous veins; terminal leaflet similar but larger and equilateral, acute, 4 to 11 cm. long, 2.2 to 5.8 cm. wide; racemes axillary, about 12 cm. long, curved, very loose, few-flowered, pubescent like the stem; flowers paired; bracts deciduous, not seen; pedicels in fruit 5 to 12 mm. long, pubescent like the stem; calyx puberulous and hispid, 4 mm. long, its 4 teeth acuminate, the lowest longest; flowers not seen; stipe of fruit 5 mm. long, exceeding the calyx, densely hispidulous with straight brownish hairs; pod 1 or 2 jointed, 3.4 to 5.5 cm. long, divided on the lower side nearly to the dorsal isthmus, rufescent-ciliate and rather sparsely rufescent-pilose with ascending, not hooked hairs; joints reniform-suborbicular, 3 cm. long, 2.5 cm wide, reticulate, marginate, whitish, with a sinus 2 to 3 mm. deep in the middle of the back, not at all or only very obscurely beaked at apex.

Type in the U. S. National Herbarium, no. 989635, collected on edge of woods, along trail from Hacienda El Limón to El Paraíso, Department of Copán, Honduras, May 12, 1919, by S. F. Blake (no. 7359).

This species is a member of the group *Nephromeria* and is closest to **Meibomia purpusii** (T. S. Brandeg.) Blake,[4] but may be distinguished by its much broader leaflets, pubescent with longer rufescent hairs, and by its larger loment joints, which are not beaked at apex.

Meibomia prorepens Blake, sp. nov.

Herbaceous, the stems prostrate, 1 meter long, densely spreading-pilose with dull-white hairs about 1 mm. long, the internodes 3 to 11 cm. long; stipules lance-subulate, 8 to 10 mm. long, attenuate, persistent, connate on one side at base for about 3 mm., quickly becoming brown and stiff, striate, densely pilose; leaves 3-foliolate; petioles 4 to 9.5 cm. long, densely spreading-pilose; rachis 5 to 12 mm. long, like the petiolules (2 to 4 mm. long) densely spreading-pilose; stipels linear-subulate, striate, persistent, 4 to 6 mm. long; lateral leaflets ovate, 5 to 10 cm. long, 2.5 to 5 cm. wide, acuminate, mucronulate, at base broadly rounded or subcordate-rounded, papery, above deep green, evenly ascending-

[3] Symb. Antill. **2**: 303. 1900.

[4] *Desmodium lunatum* T. S. Brandeg. Zoe **5**: 246. 1908. Not *D. lunatum* Huber, 1906; *Meibomia lunata* Rose & Standl. Contr. U. S. Nat. Herb. **16**: 215. 1913; *Desmodium purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 53. 1914.

pilose with short hairs, glabrescent, beneath glaucescent, in youth densely sericeous-pilose, at maturity rather densely pilose with ascending white hairs, those along the veins spreading, the lateral veins 5 or 6 pairs, whitish and prominent beneath, the secondaries and tertiaries prominulous-reticulate beneath and to a less degree above; terminal leaflet rhombic-ovate, 5.5 to 10.8 cm. long, 2.5 to 6 cm. wide, acuminate, broadest usually below the middle, cuneate-rounded at base; peduncles solitary in the axils, erect, about 18 cm. long, rather densely spreading-pilose, and pubescent with shorter uncinate spreading hairs, bearing two or three pairs of broadly ovate short-pointed pilose bracts about 5 mm. long, these connate on one side for half their length; raceme simple, loose, about 14 cm. long in fruit, the somewhat zigzag rachis densely uncinate-pubescent with short, stiff, spreading, yellowish white hairs; bracts suborbicular-ovate, about 3 mm. long, short-pointed, dry, striate, deciduous; pedicels mostly paired, 5 mm. long in flower, 10 mm. in fruit, spreading or ascending, uncinate-pubescent; calyx uncinate-puberulous and toward tip spreading-pilose, the upper lip suborbicular, emarginate, 1.8 mm. long (from base of tube), the lower 3-lobed to middle, the lobes ovate, acute, the middle one 2.5 mm. long (from base of tube); corolla deep magenta, 5 mm. long, glabrous, the banner obovate-orbicular, scarcely emarginate; loment on an erect uncinate-puberulous stipe 5 to 6 mm. long, 1 or 2-jointed, densely uncinate-puberulous especially toward the lower margin, straightish above, lobed about to middle on lower side, the broad isthmus dorsal, scarcely inflexed above, the joints oval-semi-orbicular, 6 to 8 mm. long (scarcely mature), 4 mm. wide, slightly inflexed on the dorsal suture, broadly rounded on the lower, the persistent recurved style glabrous except at base, 2 mm. long.

Type in the U. S. National Herbarium, no. 1,037,058, collected at Los Amates, Department of Izabal, Guatemala, May 29, 1919, by S. F. Blake (no. 7718).

Meibomia prorepens is related to *M. umbrosa* Britton, of Jamaica. That species, however, is described as having the leaflets finely pubescent beneath and obliquely obtuse at the base, the bracts of the peduncle lance-subulate, the fruiting pedicels 2 cm. long, and the joints of the loment obliquely oblong, nearly separated, 8 mm. long and 5 mm. high.

Lonchocarpus izabalanus Blake, sp. nov.

Tree 8 meters high, with dense head; older branches gray-barked, glabrate, the younger olive-green, finely strigillose with rusty hairs and glanduliform-papillose; petioles 6 to 6.5 cm. long, subterete, striatulate, pubescent like the younger branches; rachis 6 to 7 cm. long; petiolules 5 to 6 mm. long, densely rusty-strigillose; leaflets 7, opposite, oblong to obovate-oblong, those of the lowest pair 6.5 cm. long, 3.5 cm. wide, the others 8 to 11.8 cm. long, 4 to 5 cm. wide, abruptly short-pointed, rounded or cuneate-rounded at base, papery, obscurely punctate, entire, above green, sparsely and minutely strigillose, glabrescent, beneath glaucescent with glanduliform-papillose hairs, finely strigillose with whitish and rusty hairs, with some longer curved hairs along the veins, the lateral veins 7 to 9 pairs, prominent, the secondaries somewhat prominulous-reticulate; panicles axillary, cylindric, normally 15 cm. long (including the 3 to 5 cm. long peduncle), 2.5 cm. thick, dense above; primary pedicels mostly 2-flowered, 1.5 mm. long, finely strigillose like the rachis; secondary pedicels 0.8 mm. long; calyx 3 mm. long, rusty-strigillose, the depressed-deltoid teeth acutish, the lowest one longer and acute; banner suborbicular-oval, 12 mm. long, 9.5 mm. wide when spread out, retuse, slightly cordate at base and very short-clawed (claw 1.2 mm. long), densely silky-strigillose outside with subrufescent hairs, outside greenish with maroon border, inside maroon with

green spot at base; lateral petals obliquely cuneate, strigillose toward base of lamina above, deep maroon, 11.5 mm. long (claw 2 mm.); keel petals similar to the lateral, strigillose toward base of lamina; staminal sheath white; ovary and style strigose; ovules 3.

Type in the U. S. National Herbarium, no. 989626, collected on shore of Lake Izabal, Izabal, Department of Izabal, Guatemala, June 1, 1919, by S. F. Blake (no. 7841).

Although it is difficult to place this species definitely in the absence of fruit, it seems to be most nearly allied to *L. luteomaculatus* Pittier, which has a purple keel with a large yellow spot at the base. Its native name is "almendro."

OXALIDACEAE.

Oxalis stenomeres Blake, sp. nov.

Slender annual, once forked near the middle, 35 cm. high; stem terete, purplish, glabrous; leaves pinnately 3-foliolate, the leaflets deflexed; petioles 5 to 10 mm. long, glabrous or sparsely pilose above, the rachis 2 to 4 mm. long; lateral leaflets subsessile, elliptic-ovate, 3.5 to 6 mm. long, 1.5 to 2 mm. wide, oblique at base, obliquely emarginate at apex, thickish, glabrous, pale beneath; terminal leaflet narrowly elliptic-lanceolate, 12 to 23 mm. long, 2 to 5 mm. wide, obscurely cordate at base, emarginate at apex, the spreading-pilose petiolule 0.6 mm. long; peduncles axillary, glabrous, 1.6 to 2.6 cm. long; cymes short, bifurcate, about 7-flowered; bracts subulate, 1.2 mm. long; pedicels 1.5 to 3 mm. long, glabrous, jointed in the lower third; sepals oval-ovate, obtuse, membranaceous, 3.5 to 4.5 mm. long, sparsely ciliolate with stipitate glands, bearing 2 or 3 bristles at apex and a few loose deciduous hairs at base; petals yellow, 6 mm. long; longer filaments appendaged dorsally, ciliolate above the appendage; styles 5, hairy; capsule oval-ovoid, blunt, 4.5 mm. long, ciliate on the angles.

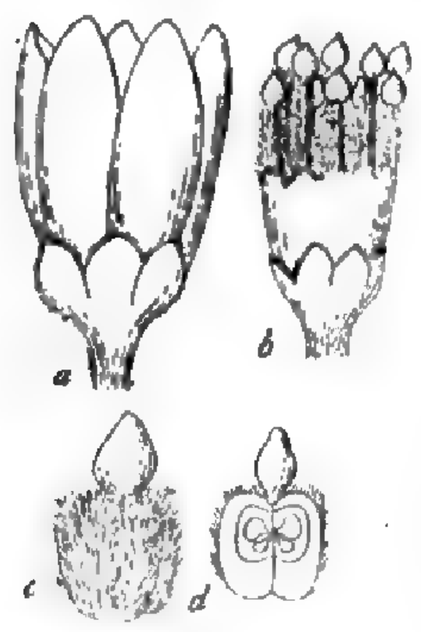


FIG. 1.—Details of *Decazyx macrophyllus*. *a*, Flower; *b*, androecium; *c*, gynoecium; *d*, the same in longitudinal section. Scale 4.

Type in the U. S. National Herbarium, no. 989607, collected on open rocky hillside thinly wooded with pine, on trail from Los Amates to Izabal, Department of Izabal, Guatemala, May 31, 1919, by S. F. Blake (no. 7791).

Oxalis stenomeres is closely related to the rare *O. angustifolia* H. B. K. (*Lotoxalis angustifolia* Rose), but differs from the description of that species in its habit, its small lateral leaflets, and its somewhat pubescent calyx.

RUTACEAE.

Decazyx Pitt. & Blake, gen. nov.

Tree with alternate large simple punctate leaves; flowers white, in slender racemiform panicles; sepals 5, free, imbricate, persistent; petals 5, free, imbricate, generally deciduous; disk short, spreading, repand-crenate; stamens 10, alternately unequal, united for about half their length and deciduous in a ring, the filaments lance-subulate, the short anthers dorsifixed; carpels 5, coherent; style 1, short, thick, the stigma globose-ovoid; ovules 2, superposed, subhorizontal; one or two (rarely five) follicles maturing, coriaceous, dehiscing by the ventral suture and over the top; seed solitary, filling the pod, inclosed by the crustaceous 2-lobed free endocarp except at the hilum; embryo with flat oval cotyledons, in thin horny endosperm, the short radicle bent against the broad side of a cotyledon.

DECAZYX MACROPHYLLUS PITT. & BLAKE.

Decazyx macrophyllus Pitt. & Blake, sp. nov. PLATE 3. FIGURES 1, 2.

Large tree; branches rufous-strigillose, glabrate, grayish-barked; leaves alternate, rather crowded, the blades cuneate-obovate, 18 to 28 cm. long, 5 to 9 cm. wide, short-pointed, long-cuneate at base, pergamentaceous, densely punctate, entire, slightly repand, glabrous, somewhat shining above, paler green and duller beneath, the lateral veins 18 to 28 pairs, prominulous beneath, the secondaries loosely prominulous-reticulate; petioles stout, sulcate above, glabrous, 2.5 to 3.5 cm. long, somewhat enlarged at apex; panicles several toward tips of branches, probably subtended by reduced leaves, slender-cylindric, 18 to 27 cm. long (including the 1.5 to 4.5 cm. long peduncle), about 1.8 cm. thick, rather dense, strigillose; primary branches of panicle 5 to 15 mm. long, erect, simple or forked, the usually zigzag rachis 1 to 6-flowered; pedicels 1.5 to 4.5 mm. long; bracts and bractlets triangular, persistent, 1 to 2 mm. long; sepals ovate, obtusish, subherbaceous, thickish, ciliolate and strigillose, 1 mm. long; petals rhombic-cuneate, obtuse, sparsely gland-dotted, glabrous, 3.5 mm. long, 1.4 mm. wide; stamens shorter than the petals, the flattened filaments hairy; gynoecium shorter than the stamens, the pistils hairy; mature follicles broadly oval, erect, 4 mm. long, sparsely pubescent, densely verrucose; endocarp yellowish white; seed oblong-ellipsoid, 3 mm. long, blackish brown, slightly shining.

FIG. 2.—Details of *Decazyx macrophyllus*. *a*, Fruit; *b*, seed inclosed in the crustaceous endocarp; *c*, seed in longitudinal section. Scale 2.5.

Type in the U. S. National Herbarium, no. 989606, collected near Los Ranchos, Department of Copán, Honduras, May 6 or 7, 1919, by H. Pittier (no. 8453).

A large tree, known to the natives as "mangle," and used for house building.

This new genus is difficult to allocate satisfactorily among the subtribes of the Rutaceae, as the family is divided by Engler, but it clearly belongs to the tribe Xanthoxyleae and probably is a member of the subtribe Evodiinae. In this group it keys to the Old World genus *Melicope*, which is tetramerous and differs in many other characters. From the Decatropidinae, to which subtribe it proceeds in Engler's key, it differs in the lack of a gynophore and in its simple leaves, as well as in its united filaments. The flowers are described as white from Mr. Pittier's field notes. In the dried plant they are a dull yellowish white with darker central portion.

EXPLANATION OF PLATE 3.—*Decazyx macrophyllus*, from the type specimen. One-half natural size.

MELIACEAE.

Cedrela longipes Blake, sp. nov.

Tree about 27 meters high, the trunk 0.7 meter in diameter; branchlets fuscous, glabrous, lenticellate, the older gray-barked; leaves alternate, 9 or 11-foliolate; petioles terete, sulcate above toward tip, glabrous, 7.5 to 11 cm. long, the rachis similar, 9 to 12 cm. long; petiolules slender, glabrous, sulcate above, 1.5 to 2.2 cm. long; leaflets alternate or subopposite, the blades obliquely ovate or oblong-ovate, acuminate or attenuate and usually somewhat falcate, at base obliquely and unequally rounded, 9.5 to 12 cm. long, 3.5 to 4.5 cm. wide, chartaceous, glabrous, shining above, dull beneath, reticulate both sides with slightly prominulous veinlets, the chief veins about 10 pairs, whitish and prominulous on both sides; panicles subterminal, glabrous, nearly equaling the leaves, the peduncle about 1 cm. long, the panicle broadly pyramidal, 22 cm. long, 23 cm.

wide or more, the many-flowered branches and branchlets spreading at right angles, the cymules 2 or 3-flowered, the pedicels 1 to 2 mm. long; calyx 2.5 mm. long, splitting irregularly, the 5 teeth deltoid, obtusish, obscurely ciliolate; petals 5, quincuncial in aestivation, narrowly oblong, obtuse or apiculate, 7.5 mm. long, 2.5 mm. wide, densely griseous-puberulous outside, short-ciliate, pilose within, adnate to the column by a ventral ridge for nearly half their length; column glabrous, equaling the pistil; stamens 5, shorter than the pistil, the subulate filaments 2 mm. long, sparsely pilose at middle, the oblong sagittate-based apiculate glabrous anthers 1 mm. long; pistil 4 mm. long, glabrous, the ovary subglobose, scarcely exceeding the stout style, the stigma 1.5 mm. wide.

Type in the U. S. National Herbarium, no. 989582, collected in clay soil at El Paraíso, Department of Copán, Honduras, altitude about 750 meters, May 8, 1919, by H. N. Whitford and L. R. Stadtmiller (no. 30).

This species is easily distinguished by its glabrous long-petioluled leaflets. It bears the vernacular name "cedro."

Trichilia izabalana Blake, sp. nov.

Tree 8 meters high; branches olive-green, obscurely puberulous, glabrate; leaves alternate, 7-foliolate; petioles dully puberulous, somewhat flattened above, 5.5 to 7.5 cm. long; rachis flattened and sulcate above, puberulous, 9 to 14 cm. long; petiolules of the lateral leaflets 3 to 7 mm. long, of the terminal 2 cm. long, puberulous; lowest pair of leaflets disjunct, the blades oval, obtuse, normally 6 to 8 cm. long, 4.5 to 5.5 cm. wide; two upper pairs of leaflets opposite, the blades oval to obovate-oval, 9.5 to 15 cm. long, 4.8 to 7.2 cm. wide, obtuse or bluntly short-pointed, at base cuneate to rounded, papery, entire, glaucescent-green above, glabrous except for the puberulous sulcate costa, beneath brighter green, puberulous along the prominent costa and sparsely so along the 9 to 11 pairs of prominent veins, elsewhere glabrous, the secondaries obscure; terminal leaflet obovate, equaling or sometimes smaller than the upper pairs; panicles axillary, slender-cylindric or in fruit conic-cylindric, less than half as long as the leaves, puberulous, the peduncle 4.5 to 7 cm. long, the rachis 5 to 7.5 cm. long; primary branches of panicle short, the lower about 3-flowered, the upper 1-flowered; pedicels 1 to 2.5 mm. long; calyx 1 mm. long, 5-lobed to middle with obtusish lobes, sparsely strigillose; petals 5, white, oblong-ovate, obtuse, 3.5 mm. long, sparsely puberulous outside; stamens 10, the filaments united for one-third their length, pilose on margin; anthers short, pilose; disk broad, cupular, embracing base of ovary; ovary subsericeous-velvety, 2-celled; ovules 2, collateral; style one-third as long as ovary, pubescent.

Type in the U. S. National Herbarium, no. 989604, collected on edge of woods along Río Mosinga, Izabal, Department of Izabal, Guatemala, June 2, 1919, by S. F. Blake (no. 7863).

Trichilia izabalana seems to be most nearly related to *T. oaxacana* Blake, but may be easily distinguished by its narrow panicle, odd-pinnate leaves, and evenly puberulous petioles.

EUPHORBIACEAE.

Phyllanthus capillipes Blake, sp. nov.

Shrubby below, about 30 cm. high; stem slender, simple, or branched, glabrous, somewhat zigzag; leaves alternate; stipules subulate, subscarious, persistent, 1.5 mm. long; petioles very slender, glabrous, 3 to 13 mm. long; blades lance-ovate, 3.5 to 5.5 cm. long, 11 to 21 mm. wide, acuminate, cuspidate, cuneate-rounded at base, membranaceous, glabrous, deep green above, pale beneath, pinnate-veined with about 6 pairs of lateral veins; flowers few in the axils, usually 1 pistillate and 2 or 3 staminate; pedicels of staminate flowers 5 to 7

mm. long, capillary; sepals 5, about 0.8 mm. long; disk membranaceous, broad, 5-lobed; stamens 5, united into a column, 3 of the filaments free about half their length, the other 2 united nearly to apex; anthers vertically dehiscent; pedicels of pistillate flowers capillary, 2 to 2.8 cm. long; sepals 5, broadly ovate, acutish, entire, imbricate, 1 to 1.3 mm. long, greenish-centered and pale-margined; disk cupular; styles 3, united at base, 2-parted nearly to base; stigmas capitate; capsule 3-celled, greenish white, glabrous, about 3 mm. long and wide; seeds brownish, curved, 1.8 mm. long, verrucose in about 5 lines on the broader face.

Type in the U. S. National Herbarium, no. 989594, collected in gravelly places at Quebradas, Department of Izabal, Guatemala, May 19 to 22, 1919, by H. Pittier (no. 8614).

In many features this species agrees with the description of *P. neogranatensis* Muell. Arg., but it differs in the character of the stamens, which do not agree precisely either with those of the section *Peltandra* or of the section *Kirganelia*.

Croton tragioides Blake, sp. nov.

Erect annual, about 60 cm. high, much branched, often trifurcate near middle; stem yellowish white, stellate-pilose with subsessile hairs, their knob-like bases persistent; leaves alternate; stipules linear-subulate, entire, setose-pilose, about 1.8 mm. long, persistent; petioles stellate-pilose, 3 to 18 mm. long, bearing a pair of yellowish white peziziform glands at apex; blades triangular-ovate or ovate, 2 to 5.5 cm. long, 1.3 to 3.7 cm. wide, obtusish, at base truncate-rounded to subcordate, coarsely crenate-serrate with entire or slightly dentate obtusish teeth, thin, green and sparsely pilose with mostly simple hairs above, beneath paler and more densely stellate-pilose; racemes bisexual, axillary, 4 to (at length) 15 mm. long, much shorter than the leaves, stellate-pilose; pistillate flowers one or two, basal, their pedicels in fruit 2.5 to 3 mm. long; staminate flowers crowded, about 6, their pedicels 0.6 to 1 mm. long; bracts triangular, about 0.5 mm. long, entire, hispid-pilose-ciliate but eglandular; calyx of pistillate flower 5-parted, the sepals spatulate-oblanceolate, acutish, slightly accrescent, subequal or 2 slightly larger than the others, stellate-pilose, in fruit about 3 mm. long; petals none; hypogynous glands short, lanceolate, obtuse, free, alternate with the sepals; ovary densely stellate-pilose; stigmas 3, sessile, spreading, thickish, 2-parted nearly to base; calyx of staminate flower about 1 mm. long, the 5 sepals ovate-triangular, obtuse, sparsely hispid-pilose; petals 5, oblong-ovate, acuminate to an acutish tip, 1.5 mm. long, ciliate near base with a few long hairs and sparsely ciliate at tip; hypogynous glands 5, ovate, obtuse, free; receptacle pilose; stamens 9, glabrous; capsule pale, subglobose, 4 mm. long, sparsely pilose with chiefly simple hairs; seeds compressed, dark olive-gray, lucid, 3 mm. long, finely and obscurely impressed-punctulate in longitudinal lines.

Type in the U. S. National Herbarium, no. 989621, collected on shore of Lake Izabal, Izabal, Department of Izabal, Guatemala, June 2, 1919, by S. F. Blake (no. 7854).

OTHER SPECIMENS EXAMINED:

TABASCO (?): La Colmena, August, 1889, *Rovirosa* 562.

GUATEMALA: Along roads, Livingston, February, 1905, *Türckheim* 8751 (also distributed as no. II. 1150). Weed, Livingston, April, 1905, *Maxon & Hay* 3777. Weed in banana field, St. Thomas, May, 1909, *Deam* 6056.

HONDURAS: On railroad bank, plain of Sula, 1887, *Thieme* 246. Roadsides, San Pedro Sula, May, 1888, *Thieme* 335; September, 1888, *Thieme* 558.*

COSTA RICA: Savannas of Boruca, November, 1891, *Pittier & Durand* 457.

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*These three collections by Thieme were distributed under J. D. Smith's no. 5465.

This new species is closely allied to *C. glandulosus septentrionalis* Muell. Arg., and is evidently of the same weedy nature. It is distinguished from that plant by the lack of either sessile or stipitate glands on the bracts of its inflorescence and by its smaller seeds. The specimens distributed by Captain Smith have uniformly been named *Tragia nepetaefolia*, which plant, indeed, *C. tragioides* closely resembles in general appearance.

Caperonia pubescens Blake, sp. nov.

Annual, 35 to 65 cm. high, simple or branched at base, erect or sometimes creeping and rooting at base; stem slender, densely spreading-hispid-pilose and setose-hispid, many of the hairs thickened and glandular at tip; leaves alternate; stipules linear-subulate, hispid-pilose, persistent, 3.5 mm. long; petioles 4 mm. long or less, densely pubescent like the stem; blades of lower leaves oblong to oval-oblong, 2 to 4 cm. long, 1.2 to 1.5 cm. wide, obtuse, those of the middle and upper leaves linear-lanceolate to narrowly oblong-lanceolate, 4.7 to 6 cm. long, 8 to 14 mm. wide, acute to acuminate, rounded at base, serrulate throughout with 20 to 25 pairs of acute teeth, deep green and rather sparsely hispid-pilose with simple hairs above, paler and more densely hispid-pilose chiefly along the veins beneath, the upper with 12 to 16 pairs of veins; racemes axillary, longer or the uppermost shorter than the leaves, hispid-pilose with mostly gland-tipped hairs, the peduncle about 4 cm. long, the rachis about as long; pistillate flowers solitary at base of raceme, on pedicels about 7 mm. long; staminate flowers separated by about 1 cm. from the pistillate, crowded above, on pedicels 1 mm. long; bracts triangular, persistent, hispid-pubescent, 0.8 mm. long; sepals of pistillate flower unequal, 3 larger, 2 smaller, united below, oblong to obovate-oblong, obtusish, slightly accrescent, rather sparsely pilose-setose with gland-tipped hairs, the larger 3 to 3.5 mm. long; petals not seen; ovary densely muricate, hispid-pilose and more sparsely pilose-setose; styles laciniate-parted into about 5 lobes; calyx of staminate flower 2.3 mm. long, hispid-pilose and more sparsely glandular-hispid-setose, unequally 5-lobed about to middle, the free lobes lanceolate to triangular-ovate, acute; petals 5, cuneate to cuneate-obovate, truncate to emarginate, white, glabrous, unequal, 3 larger, 2.8 mm. long, 2 smaller, about 2.3 mm. long; staminal column truncate-apiculate, glabrous; anthers in two whorls of 5, the lower with short filaments, the upper with long filaments; capsule subglobose, about 4 mm. in diameter, hispid-pilose and more sparsely glandular-hispid-setose; seeds globose, grayish, 2 mm. in diameter, finely puncticulate.

Type in the U. S. National Herbarium, no. 989603, collected in an open grassy plain at Cristina, Department of Izabal, Guatemala, May 22, 1919, by S. F. Blake (no. 7574). Also collected in essentially the same locality by H. Pittier on June 12, 1905 (no. 383).

This species is well distinguished by its dense pubescence. Unfortunately no young pistillate flowers are present, so that the presence or absence of petals in them cannot be determined.

Dalechampia molliuscula Blake, sp. nov.

Twining; stem slender, branched, dull-pilose with loosely matted hairs, glabrescent; leaves alternate, trifoliolate; stipules subulate, herbaceous, deciduous, 2.5 to 4 mm. long; petiole dull-subtomentose-pilose, 6 to 15 mm. long; stipelules subulate, 1.5 mm. long; leaflets abruptly contracted into a petiolule-like base about 1 mm. long, the lateral blades obliquely ovate, 3.5 to 6.5 cm. long, 1.3 to 3.3 cm. wide, acute or acuminate, truncate-rounded on lower side at base, oblique on the upper, crenate-serrulate with blunt depressed teeth, pergamentaceous, deep green above and sparsely pilosulous, densely so along the costa, glabrate, beneath duller green and rather densely dull-pilosulous with spreading hairs

especially along the veins, prominulous-reticulate; terminal leaflet oval or elliptic, acute to acuminate, acute at base, 5 to 8 cm. long, 1.8 to 3.8 cm. wide; peduncles solitary in the axils, about 1 cm. long; bracts of the involucre suborbicular-ovate, in fruit 2 cm. long, 2.5 cm. wide, 3-lobed about to middle with the middle lobe smallest, 5-nerved, sessile, pubescent like the leaves; calyx of pistillate flowers about 8 mm. long in fruit, the 12 sepals linear, laciniate-pinnate above, pilose-spinose; capsule 9 mm. wide, sparsely pilose-spinose; style column linear, slightly dilated and excavate at tip, persistent, sparsely pilose-spinose, about 7 mm. long; seeds subglobose, about 3 mm. long, dull grayish, marked with about 5 lighter lines.

Type in the U. S. National Herbarium, no. 989631, collected on edge of thicket at Quebradas, Department of Izabal, Guatemala, May 20, 1919, by S. F. Blake (no. 7547).

Related to *Dalechampia triphylla* Lam., but to be separated by its shorter and comparatively broader leaflets, these densely soft-pubescent beneath.

Manihot gualanensis Blake, sp. nov.

Shrub 4 meters high; stem stout, green, glabrous; leaves alternate; stipules deciduous, not seen; petioles stout, striatulate, glabrous, 20 to 23 cm. long; blades orbicular in outline, 24 cm. long (from tip of basal lobes to apex), 25 to 29 cm. wide, thin-papyraceous, 9-lobed to within about 2 cm. of base, the lobes obovate to rhombic-obovate, broadest above the middle, the middle lobe and sometimes one or two of the lateral ones somewhat abruptly repand-dilated above the middle, acute and cirrhous-tipped, entire or rarely obscurely repand-lobed above, glabrous and dark green above, glaucous with a microscopic pulverulence beneath, the lateral veins about 9 to 13 pairs, prominulous beneath, the secondaries few and slightly prominulous or obscure, the middle and upper lobes 11 to 16.5 cm. long, 4.5 to 6.5 cm. wide, the lowest pair much reduced, about 4.5 cm. long, 1.5 cm. wide; panicles several in the axils, 11 cm. long, many-flowered, glabrous, pistillate below, staminate above, the flowers nodding; bracts linear-subulate, entire, glaucous, 2 to 6 mm. long; pedicels 1 to 4 mm. long; pistillate calyx greenish, glaucous, 12 mm. long, the 5 sepals lance-oblong, obtuse, 3-nerved, 4 mm. wide; disk fleshy, entire, 1 mm. high; pistil 6 mm. long; ovary subglobose, glabrous; styles 3, shortly united at base, much lobed and lobulate; staminate calyx (not quite mature) 7 mm. long, glabrous, glaucous, in bud subglobose, the 5 sepals oblong, obtuse, 3-nerved, 3 mm. wide; stamens 9, glabrous; disk depressed, fleshy, 9-lobed; ovary rudiment obsolete.

Type in the U. S. National Herbarium, no. 989599, collected on edge of woods, Gualán, Department of Zacapa, Guatemala, May 26, 1919, by S. F. Blake (no. 7688).

Manihot gualanensis seems from description to be most closely related to *M. rhomboidea* Muell. Arg., of Mexico, but it differs in its deciduous stipules and its 9-lobed leaves, as well as its smaller staminate calyx. Flowers occur in the intermediate part of the panicle with all or nearly all the stamens abortive, a large 10-lobed disk, and a definite ovary rudiment.

Euphorbia stenomeres Blake, sp. nov.

Erect, very slender annual, simple or branched from the base, 12 to 32 cm. high; stem greenish, glabrous, the branches short, filiform; leaves opposite; stipules united, glandular-denticulate, about 0.4 mm. long; petioles stoutish, 1 mm. long; blades linear, 7 to 23 mm. long, 1 to 1.8 mm. wide or the lowest 2.5 mm. wide, often falcate, obtuse or acute, at base unequal, obliquely rounded or subcordate, obscurely or distinctly mucronulate-denticulate above or nearly throughout, thickish, glabrous, above deep green, beneath glaucescent, triplinerved, the lateral nerves reaching to about the middle; cymules few-flowered,

terminating branches and branchlets; bracts minute; pedicels about 0.6 mm. long; involucre glabrous, campanulate, about 0.8 mm. long; glands 5, small, cup-shaped, 4 of them with white thickish suborbicular entire appendages about 0.6 mm. long; styles 3, oblong, equaling the ovary, bifid at apex; capsule glabrous, greenish, with rounded angles, 1.3 mm. long; seeds oblong, 0.9 mm. long, 0.5 mm. wide, blackish, bluntly quadrangular, microscopically papillose, the faces with about three low broken transverse ridges.

Type in the U. S. National Herbarium, no. 989628, collected on open hillsides wooded with pine, along trail from Los Amates to Izabal, Department of Izabal, Guatemala, May 31, 1919, by S. F. Blake (no. 7776).

This species belongs in the section *Anisophyllum*, generally treated as a genus (*Chamaesyce*) by American authors, although its structural characters are of the slightest. It is related to *E. pulchella* H. B. K., but apparently differs in its strictly linear, thickish, serrulate leaves. It may prove to be identical with that species, but in any case the name *E. pulchella* is preoccupied and so unavailable.

CLUSIACEAE.

Clusia utilis Blake, sp. nov. PLATE 4.

Shrub 6 meters high; branches subterete, stoutish, gray-barked, glabrous; leaves opposite; petioles sulcate above, glabrous, 6 to 10 mm. long; blades cuneate-obovate, 5.5 to 8 cm. long, 2.7 to 4.5 cm. wide, coriaceous-pergamentaceous, obtuse or rounded, cuneate from near the middle to the base, entire, glabrous, deep dull green on both sides, scarcely paler beneath, papillose on both sides when dry, the primary veins about 15 to 17 pairs, straight, parallel, slightly prominulous when dry, the surface between them rather obscurely striate; pistillate panicles terminating branches and branchlets, about 5 to 8-flowered, glabrous, the peduncle about 6 mm. long, the branches wide-spreading, the pedicles stoutish, slightly clavate, 3 to 6 mm. long, the bracts deltoid, connate, obtusish, 1.5 mm. long; bracts at base of calyx 2, rotund, 2 to 2.5 mm. long, coriaceous; sepals 4, the outer pair suborbicular, broadly rounded, 3.5 to 4.5 mm. long, 6 mm. wide, the inner pair similar but larger, about 7 mm. long, 9.5 mm. wide; petals 6, broadly wedge-obovate, rosy white, about 1 cm. long and wide, broadly rounded; ovary surrounded at base by a dense glutinous collar of connate staminodes 1.5 to 2.5 mm. high, bearing scattered, sessile, vertically dehiscing, 2-celled anthers; ovary 5 mm. high, subglobose, 6 or 7-celled; stigma sessile, fleshy, as broad as the ovary, bluntly 6 or 7-lobed; fruit subglobose, 12 to 15 mm. long, green tinged with maroon, surrounded at base by the persistent calyx; seeds about 6 in each cell, horizontal-ascending, subbiseriate, pale grayish, about 3.5 mm. long, surrounded by the orange aril.

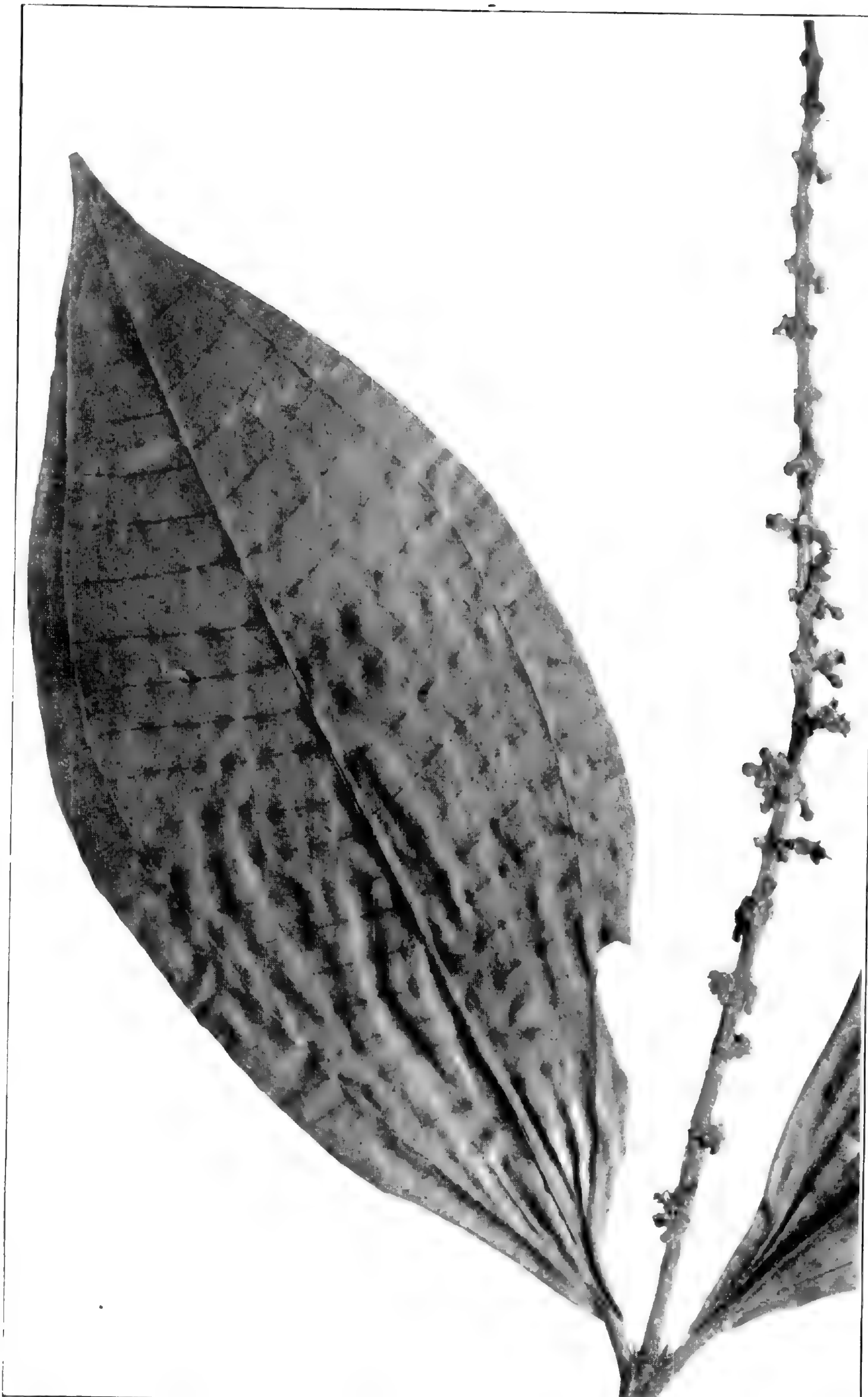
Type in the U. S. National Herbarium, no. 989595, collected on shore of Lake Izabal, Izabal, Department of Izabal, Guatemala, June 2, 1919, by S. F. Blake (no. 7859).

Owing to the lack of staminate flowers, it is difficult to place this species definitely. From description it seems to be close to *Clusia parvicapsula* Vesque, to which Vesque assigns a range from Córdoba, Mexico, to Colombia and Peru. From this species *C. utilis* differs in its subterete branches, its smaller leaves on shorter petioles and with rather more numerous lateral veins, and its much shorter crown of fused staminodes, which bears rather numerous anthers.

Clusia utilis is known at Izabal as "quiebramuela," in reference to the fact that the buffy yellow juice of the fruit is used on cotton for toothache. The young fruit, cut across, is used to stamp clothes, forming a wheel-shaped design, brown at first and changing to blackish on washing, which is said to be permanent.

EXPLANATION OF PLATE 4.—*Clusia utilis*, from the type specimen. Natural size.

CLUSIA UTILIS BLAKE.



MICONIA ANGUSTISPICA BLAKE.

MELASTOMATACEAE.

Miconia angustispica Blake, sp. nov. PLATE 5.

Small tree; branches compressed, subangulate, glabrate, grayish-barked; branchlets compressed, hexangular, densely stellate-pilose with depressed sordid hairs; leaves opposite; petioles stout, 4 mm. long, densely depressed-stellate-pilose; blades oval-elliptic, 16 to 20.5 cm. long, 6 to 8 cm. wide, shortly falcate-acuminate, at base long-cuneate, broadest near the middle, chartaceous, entire, above dull green, obscurely and sparsely tuberculate but smooth, beneath scarcely paler green, along the venation densely stellate-pilose, on surface sparsely so, 3-ribbed (with an additional obscure marginal vein), the lateral veins about 27 pairs, prominulous, the secondaries less prominulous; peduncle (1.8 cm. long) and the straight rachis of the spikelike panicle (19.5 cm. long, 1.3 cm. thick) densely stellate-pilose with sordid-rufescent hairs; flowers verticillate, white, sessile; calyx urceolate, 4 mm. long, truncate, minutely 5-toothed; petals (in bud) suborbicular, obtuse, externally puberulous; stamens 10; filaments glabrous, 2 mm. long; anthers lance-subulate, slender, 3 mm. long, with a short obtuse dorsal basal appendage; ovary 5-celled; style cylindric, straight.

Type in the U. S. National Herbarium, no. 989618, collected in clear forests at Quebradas, Department of Izabal, Guatemala, May 19 to 22, 1919, by H. Pittier (no. 8596).

This species belongs in the group *Haplostachyae* of *Eumiconia* and is distinguished among the species of that group by its oval-elliptic 3-ribbed short-petioled leaves.

EXPLANATION OF PLATE 5.—*Miconia angustispica*, from the type specimen. Natural size.

Prosanerpis Blake, gen. nov.

Corticicolous shrubs, climbing by nodal and internodal roots and rootlets; leaves large, membranaceous, dentate or denticulate, ovate, those of the pairs very unequal; flowers small, in small axillary and extra-axillary dichotomous fasciculate cymes; bractlets minute; calyx tube subglobose, abruptly contracted above the ovary into a short neck or the latter obsolete, the limb 4 or rarely 5-lobed, the inner lobes deltoid, acutish, adnate for most of length to the outer lobes, these oblong or rhombic-oblong, acute, hispid-spinose on margin, three to five times as long as the inner; petals 4 or rarely 5, quadrate-oblong, subtruncate, slightly retuse, about half as long as calyx lobes; stamens 8 (or 10), strongly inflexed (in young flower), glabrous, the linear filaments equaling the ellipsoid-oblong obtuse unappendaged anthers; ovary thin-walled, free from calyx tube except at apex, globose, 4-celled, the placentae extending into the middle of the cells and 2-winged at tip; style cylindric, straight, longer than ovary, equaling the petals, the stigma subcapitate, slightly broader; fruit a dryish berry; seeds innumerable, tiny, cuneate-oblong, straight.

Type species, *Prosanerpis trichocalyx* Blake.

This genus, possessing a habit decidedly unusual in its family, belongs in the Miconieae next to *Henriettea* DC., from which it differs in its obtuse, not beaked anthers, and its membranaceous denticulate leaves. An undescribed species occurs in Panama.

Prosanerpis trichocalyx Blake, sp. nov.

Stem woody, terete, about 4 mm. thick, climbing up tree trunks to a height of 2 meters or more by means of numerous chiefly adventitious roots and rootlets, closely appressed, sparsely branched, in youth fuscous and rather densely spreading-hispid with sordid hairs, in age glabrate and brownish; leaves few, opposite, those of the pairs very unequal; petioles of the larger

leaves slender, striate, 9 cm. long, rather densely hispid with loosely spreading sordid hairs; blades ovate, about 19 cm. long, 11 cm. wide, acuminate, broadly rounded at base, finely crenulate-denticulate throughout, membranaceous, 7-nerved and prominulous-reticulate beneath, above deep green, evenly but not densely pilose-hispid and ciliate with ascending, scarcely tuberculate-based, dull white hairs, beneath loosely spreading-pilose on all the veins and veinlets; cymes few, in axillary and extra-axillary fascicles, dichotomous, about 12 mm. long, few-flowered, densely puberulous with subglandular hairs; bractlets triangular, acute, denticulate, cuspidulate, subherbaceous, 0.8 mm. long or less; pedicels 2 mm. long or less, densely subglandular-puberulous; body of calyx tube in flower 2 mm. long, subglobose, densely spreading-hispid and subglandular-puberulous, in fruit 3 mm. long and thick, abruptly contracted into a free tubular-campanulate apex 1 mm. long; outer calyx lobes oblong or rhombic-oblong, acute, sometimes with two lobes near middle, hispid-spinose-ciliate, 3 to 4 mm. long, spreading in fruit; petals in young flower 1.2 mm. long, 0.9 mm. wide, oblong-quadrate, subtruncate, slightly retuse, glabrous, probably whitish or pinkish; filaments 1 mm. long, equaling the anthers; seeds 0.5 mm. long, white and yellowish.

Type in the U. S. National Herbarium, no. 989630, collected on tree trunks in tropical forest, Quebrada Mojanales, Department of Copán, Honduras, May 16, 1919, by S. F. Blake (no. 7476).

MYRSINACEAE.

Stylogyne guatemalensis Blake, sp. nov.

Shrub; branches stout, terete, fuscous becoming grayish brown, glabrous; leaves alternate; petioles stout, sulcate above, glabrous, unmargined, 5 to 12 mm. long; blades oval or slightly obovate-oval, 6 to 12 cm. long, 3 to 6 cm. wide, very shortly apiculate-acuminate, at base cuneate, entire, coriaceous, deep dull green above, obscurely squamulate, beneath paler and duller green, evenly but rather sparsely white-papillose, glabrous on both sides, the chief veins about 28 to 30 pairs, prominulous beneath, curved-anastomosing near the margin, somewhat anastomosing-reticulate; panicles pyramidal, subsessile, terminating branchlets, 3.5 to 4.5 cm. long and as wide or slightly wider, glabrous, the flowers unbellate-clustered toward the tips of the branchlets of the panicle, on pedicels 2 to 3.5 mm. long; sepals 5, oval-oblong, 1.8 mm. long, rounded, free, dorsally elevated-punctate, coriaceous-herbaceous, with narrow paler margin, glabrous, entire; petals 5, oblong, 4.8 mm. long, united for one-third their length, obtuse or rounded, pinkish white, marked with about 5 rows of glandular dots and lines, glabrous, imbricate, dextrorsely covering one another; stamens 5, inserted about 0.5 mm. above base of corolla, the subulate glabrous filaments 1 mm. long, the oblong anthers 1.7 mm. long, basifixed, dehiscent throughout their length, not punctate; ovary ovoid, 1.2 mm. long, glabrous; ovules 3, in a single row; style slender, glabrous, 2 mm. long; stigma small, subcapitellate.

Type in the U. S. National Herbarium, no. 989596, collected in light forest at Quebradas, Department of Izabal, Guatemala, May 19 to 22, 1919, by H. Pittier (no. 8624).

From the only other species known in Central America north of the Isthmus of Panama, *Stylogyne laevis* (Oerst.) *Mez*, *S. guatemalensis* is distinguished by its shorter pedicels, its oblong-oval, entire or subentire sepals, and its rounded symmetrical petals.

LOGANIACEAE.

Plocosperma anomalum Blake, sp. nov.

Shrub 2 to 5 meters high, erectish-branched, the stem and branches (1.2 to 3 mm. thick) in youth flattened, spreading-puberulous, in age glabrous, subterete, irregularly ribbed, gray-barked; leaves opposite, those on the older branches chiefly borne in pairs on axillary branchlets only 1 mm. long; petioles spreading-puberulous, 1 to 1.5 mm. long; blades elliptic-oblong or oval-oblong, 1.5 to 4 cm. long, 0.8 to 2 cm. wide, emarginulate, at base rounded and slightly unequal, entire, slightly revolute, chartaceous, above deep green, somewhat shining, finely papillose-tuberculate especially near the costa, papillose-hispidulous-ciliolate, beneath slightly paler green, in youth evenly but sparsely spreading-pilosulous, at maturity glabrous or very sparsely pilosulous, the costa immersed above, prominent beneath, the chief veins 2 or 3 pairs, leaving the costa below the middle of the leaf and prolonged nearly or quite to apex, like the secondary veins conspicuous and subprominulous above, less conspicuous beneath; flowers solitary or in pairs at tips of branches and short branchlets, the peduncle 1.5 mm. long or usually wanting, the spreading-puberulous pedicels 6 to (in fruit) 13 mm. long, erect or in fruit more or less decurved; calyx 3 mm. long, 6-parted, the sepals subequal or one slightly the longest, lanceolate or lance-oblong, narrowed to an acutish apex, herbaceous, hispidulous-ciliate and more or less glandular and hispidulous dorsally, about 0.8 mm. wide; corolla purplish magenta, with campanulate-funnelform tube (6 mm. long), and spreading limb about 18 mm. wide, the tube sparsely pubescent on the nerves above, the limb ciliate, the 6 rotund lobes about 7 mm. long, 6 mm. wide; stamens 6, the filaments slender, glabrous, 4 mm. long, attached 4 mm. above base of corolla and decurrent to its base, the oval, deeply cordate, obtuse, dorsifixed anthers 1.3 mm. long; ovary slenderly ovoid, contracted above the short sterile crenulate base and then expanded, about 3 mm. long, 1-celled, 4-ovuled, the ovules approximate at base of ovary in decussate pairs, roundish, erectish, parietally affixed on very short funicles; style about 6.5 mm. long, glabrous, 4-fid at apex, the lobes about 2 mm. long, terminated by clavate papillose stigmas; fruit fusiform-linear, 8.5 to 9 cm. long, about 2 mm. thick near the middle, glabrous, striate-ribbed, apiculate; seeds immature.

Type in the U. S. National Herbarium, no. 989586, collected on dry hillside, Gualán, Department of Zacapa, Guatemala, May 26, 1919, by S. F. Blake (no. 7693).

ADDITIONAL SPECIMEN EXAMINED:

GUATEMALA: Gualán, June 15, 1909, *Deam* 6270.

This interesting genus was based on *Plocosperma buxifolium* Benth.,[6] described without definite locality from Guatemala, where it was collected by Skinner. It has apparently not been collected since. The only other species of the genus hitherto known, *P. microphyllum* Baill., has had an unfortunate history. It was described at length by Baillon in 1889,[7] from the "collections mexicaines de Galeotti," but no name was assigned to it. Later it was mentioned by Solereder,[8] without explicit reference to Baillon's description, in the following terms: "*Pl. microphyllum* Baill. MS., in Mexiko, ist von der ersten Art durch bedeutend kleinere B. und Bl. verschieden." By error, this name is cited in the first supplement to the Index Kewensis as *P. macrophyllum*. This species is of special interest, since it resembles *P. anomalum* in the ar-

[6] Hook. Icon. Pl. **12**: 82. *pl. 1195*. 1876.

[7] Bull. Soc. Linn. Paris **1**: 780. 1889.

[8] In Engl. & Prantl, Pflanzenfam. **4**[2]: 50. 1895.

rangement of its ovules. As the publication in which it was described is not easily accessible, the original description may be summarized here.—*P. microphyllum* Baill. Leaves similar to those of *P. buxifolium*, but only 1 cm. long, notched at each end, few-nerved, short-petioled; flowers subsessile, very small, "un peu plus grandes que les feuilles," similar to those of *P. buxifolium;* ovary 1-celled, with two linear parietal placentae; ovules all basilar and erect, usually only one at the base of each placenta, but sometimes two.

Portions of Deam's plant have been compared at Kew with Bentham's type, through the kindness of Dr. Otto Stapf, who reports that they represent a different species, that of Bentham having leaves very distinctly puberulous below and not nervose or reticulate, the flowers being much larger, and the ovules, as figured in Hooker's Icones, being in superimposed pairs, the lower pair erect, the upper pendulous. The flowers of *P. buxifolium*, moreover, are pentamerous. From *P. microphyllum* Baill. the new species differs in its larger leaves and larger longer-pedicellate hexamerous flowers.

APOCYNACEAE.

Tabernaemontana amblyblasta Blake, sp. nov. PLATE 6.

Shrub 5 meters high; branches subterete, glabrous, the younger green, the older grayish-barked; leaves opposite; petioles glabrous, sulcate above, 6 to 17 mm. long; blades obovate-oblong to oval, elliptic-oblong, or rarely obovate, 7 to 21 cm. long, 3.5 to 7.5 cm. wide, abruptly short-pointed with the tip obtuse, at base cuneate to rounded-cuneate, entire but somewhat repand, deep green and more or less shining above, paler green beneath, glabrous, the costa impressed above, prominent beneath, the 11 to 13 pairs of primary veins prominulous beneath; panicles axillary, 10 to 18 cm. long (including the 2.5 to 8 cm. long peduncle), dichotomously divided, 7 to 14 cm. wide, glabrous; pedicels slender, 7 to 20 mm. long; buds obtuse, 8 to 11 mm. long; sepals 5, broadly ovate, broadly rounded at apex, 2 mm. long, thickish, with thinner narrow margins, each with a 4 to 8-cleft gland at base; corolla tube 9 mm. long, the limb cream-colored or creamy yellowish, 12 to 17 mm. wide, the tube broadest near the base, slightly widened above the middle at the insertion of the stamens, bearing 5 callosities at the apex within alternating with the stamens, the segments of the limb 5, obliquely oval-oblong, 8.5 mm. long, 4 mm. wide, rounded at apex, entire; stamens sessile at a point 5.5 mm. above the base of the corolla, the lanceolate-acuminate bluish green anthers 2.5 mm. long, included; fruit said to be yellow or green.

Type in the U. S. National Herbarium, no. 989598, collected on edge of woods at Cristina, Department of Izabal, Guatemala, May 23, 1919, by S. F. Blake (no. 7636).

OTHER SPECIMENS EXAMINED:

GUATEMALA: Edge of woods, Los Amates, Department of Izabal, May 29, 1919, *Blake* 7732. Shore of Lake Izabal, Izabal, Department of Izabal, June 2, 1919, *Blake* 7853.

HONDURAS: Woods, La Florida to Hacienda Espíritu Santo, Department of Copán, Honduras, May 14, 1919, *Blake* 7415.

This species is most closely related to *Tabernaemontana longipes* Donn. Smith, which has pedicels 4 to 8 mm. long, acute buds, and a corolla 20 mm. wide, its lobes obliquely ovate, strongly excised on one side above, and inequilateral.

This species, like so many others of its group, bears the varnacular names "chapupo," "cojón," "cojón de gato," and "cojón de mico." At Izabal, and doubtless elsewhere, the juice is mixed with chicle for local use; it is also put on the flesh, with a piece of tobacco leaf, to draw out carnivorous insect larvae.

EXPLANATION OF PLATE 6.—*Tabernaemontana amblyblasta*, from *Blake* 7853. Natural size.

TABERNAEMONTANA AMBLYBLASTA BLAKE.

ASCLEPIADACEAE.

Metastelma collinum Blake, sp. nov.

Root thickened, subtuberous, 2 to 3 cm. long, 5 to 10 mm. thick; stems 3 to 5, about 0.5 meter long, twining or erectish, very slender, pale green, recurved-pilosulous in lines; leaves opposite, about equaling the internodes; petioles ciliolate, 1 to 2.5 mm. long; blades linear, 13 to 33 mm. long, 1.2 to 2.2 mm. wide, often falcate, acute, rounded at base, more or less revolute, subcoriaceous, 1-nerved, pale green, sparsely ciliate, otherwise essentially glabrous; cymules axillary, about 4-flowered, incurved-puberulous, the peduncle and pedicels 1 to 2 mm. long; calyx 0.8 mm. long, the 5 sepals lance-triangular, obtuse, glabrous or rarely with a few cilia; corolla campanuate, whitish, 3 mm. long, the petals triangular-ovate, 1.2 mm. wide, united for about one-fourth their length, thickish, narrowly whitish-margined, especially on one side, and obliquely emarginulate at tip, glabrous outside, densely pilose within above the base, toward apex and inside margin densely papillose-pilosulous; segments of corona narrowly spatulate, about 1.8 mm. long, 0.3 mm. wide, obtuse, considerably exceeding the pistil.

Type in the U. S. National Herbarium, no. 989629, collected on open rocky hillsides thinly wooded with pine, along trail from Los Amates to Izabal, Department of Izabal, Guatemala, May 31, 1919, by S. F. Blake (no. 7793).

Metastelma collinum is most nearly related to *M. chiapense* A. Gray, but differs from the description of that species in having the stem pilosulous in lines, the leaves all much longer than the cymules, the petals densely pilose within below, and the corona segments considerably longer than the pistil.

BORAGINACEAE.

Cordia macrantha Blake, sp. nov.

Tree 10 meters high; branches gray-barked, glabrous, lenticellate; leaves alternate; petioles glabrous, 7 to 30 mm. long, slender, naked, weakly sulcate above; blades elliptic-oblong or slightly obovate to oval, 7.5 to 15.5 cm. long, 4 to 8 cm. wide, obtuse or rounded, sometimes emarginate, at base rounded-cuneate or cuneate, entire but slightly repand, pergamentaceous, glabrous, above deep green, prominulous-reticulate, beneath paler green, prominulous-reticulate, the lateral veins 5 to 8 pairs, curved-anastomosing at their tips; panicles terminal, 7 to 11 cm. long (including the 2 cm. long peduncle), 9 to 12.5 cm. wide, the branches wide-spreading, floriferous at their tips and there pubescent and glandular; pedicels 2 to 3 mm. long; calyx 14 mm. long, oblong, glabrous, multistriatulate, obliquely split at apex and there slightly beaked on one side; corolla marcescent, slightly pubescent within at base of filaments, the tube about 2.2 cm. long, pentagonal, the limb about 4.2 cm. wide, the 5 lobes triangular-ovate, about 1.5 cm. long, 1.1 cm. wide at base, obtuse, impressed-veined; stamens 5, inserted at apex of the proper tube of corolla, the filaments about 10 mm. long, pubescent especially at base; style very sparsely pubescent, 12 mm. long, twice bifid, the stigmas capitate; ovary glabrous, oblong, about 10 mm. long.

Type in the U. S. National Herbarium, no. 989592, collected on dry hillside at Quebradas, Department of Izabal, Guatemala, May 18, 1919, by S. F. Blake (no. 7498).

Although the material on which this species is based is scanty, consisting of two branchlets bearing old panicles and two old and imperfect flowers, it is nevertheless sufficient to show the distinctness of the species. *C. macrantha* belongs in the section *Varronia*, as the genus is divided by Gürke, and may be distinguished specifically by its very large marcescent corolla.

SOLANACEAE.

Physalis parviculea Blake, sp. nov.

Much branched spreading annual, the branches up to 30 cm. long, slender, striate-angled, somewhat zigzag, whitish, obscurely puberulous in lines on the younger parts, otherwise glabrous; leaves alternate or paired, unequal; petioles slender, unmargined, sparsely hispid-pilose, 2 to 12 mm. long; blades ovate, the larger 11 to 15 mm. long, 7 to 11 mm. wide, obtusish, at base unequal and truncate-rounded or slightly cordate, thin, entire, light green on both sides, above essentially glabrous except for the hispidulous-puberulous margin, beneath sparsely hispidulous with longer hairs chiefly along the 4 or 5 pairs of lateral veins; flowers solitary, axillary, nodding or deflexed, the pedicels ascending-hispidulous, 1.5 to 2 mm. long in flower, 3 to 4 mm. in fruit; calyx in flower campanulate, pentagonal, 3 to 3.5 mm. long, 4 mm. wide, hispid-pilose below, 10-nerved, 5-toothed, the teeth depressed-deltoid, obtuse, ciliolate, 0.8 mm. high; corolla yellow with maroon eye, 4 mm. long, 3 mm. wide, shallowly 5-lobed with deltoid acutish teeth, ciliolate, pilose-barbate within near middle in 5 spots alternating with the stamens; stamens 5, inserted slightly above base of corolla, the somewhat clavate filaments 2 mm. long, villous-barbate within for nearly their whole length, the oval bluish anthers 1 mm. long; style glabrous, 3.5 mm. long; fruiting calyx subglobose-ovoid, obtuse, closed at apex, slightly sunken at the base, 13 to 14 mm. long, 12 to 14 mm. thick, equally 10-ribbed, thin, reticulate-veined, greenish white, sparsely curved-hispidulous on the ribs; berry globose, many-seeded, about 7 mm. in diameter.

Type in the U. S. National Herbarium, no. 989588, collected in dry river bed at Los Amates, Department of Izabal, Guatemala, May 9, 1919, by S. F. Blake (no. 7318).

This species is most closely related to *Physalis lagascae glabrescens* O. E. Schulz and *P. micrantha* Link. From the former it differs in its smaller calyx, small corolla, this pilose-barbate within near base and maroon-eyed, and smaller stamens; from the latter in its larger flowering calyx and equally 10-ribbed fruiting calyx.

Physalis pentagona Blake, sp. nov.

Spreading annual, the stoutish, sparsely branched, zigzag stem about 30 cm. long, viscid and densely pilosulous with several-celled, straight or curved, spreading hairs, dull green; leaves alternate or paired; petioles slender, unmargined, pilosulous and viscid, 1 to 2 cm. long; blades ovate, 2.3 to 4 cm. long, 1.5 to 2.5 cm. wide, acute or subacuminate or obtusish, at base very unequal, cuneate to broadly rounded, entire, rather thin, dull green, densely puberulous along costa and the 4 or 5 pairs of veins above, beneath paler, evenly and rather densely pilosulous on surface, densely so on the veins; flowers solitary, axillary, the densely griseous-pilosulous pedicels 5 mm. long in flower, 8 to 10 mm. in fruit; calyx in flower 7 mm. long, broadest at the deeply sunken base, gradually narrowed toward the apex, densely griseous-pilosulous, the 5 lance-subulate acuminate teeth 2 mm. long; corolla yellow, 7.5 mm. long, about 5 mm. wide, puberulous outside and ciliolate, essentially glabrous within, the 5 teeth triangular, acutish, 1 mm. long; stamens 5, the flattened, sparsely pilose filaments 2.7 mm. long, the oblong anthers 2.5 mm. long; style 4.5 mm. long; fruiting calyx subglobose-ovoid, 2.9 cm. long, 2.5 cm. thick, strongly 5-angled with aliform angles, abruptly short-pointed with acute tip, closed at apex, sunken at base, rather weakly 1-ribbed between the angles, reticulate-venulose, firm-herbaceous, dull pale greenish, rather densely spreading-puberulous, the terminal teeth about 3 mm. long; berry globose, about 15 mm. in diameter.

Type in the U. S. National Herbarium, no. 989589, collected in dry river bed at Los Amates, Department of Izabel, Guatemala, May 9, 1919, by S. F. Blake (no. 7313).

Physalis pentagona differs from *P. pubescens* L., its nearest ally, in its shorter calyx teeth, longer fruiting pedicels, broader, abruptly short-pointed fruiting calyx, and much larger berry.

Solanum calochromum Blake, sp. nov.

Scandent shrub, glabrous throughout; branches stoutish, somewhat zigzag, subterete, glabrous, in youth fuscous-green and lucid, in age gray-barked, the internodes 2.5 to 5 cm. long; leaves paired, very unequal, the larger on petioles 1 to 1.5 cm. long, the blades oblong-elliptic, 13 to 21 cm. long, 4 to 7 cm. wide, acuminate or abruptly short-acuminate, at base cuneate and often unequal, rather thin-coriaceous, entire but usually slightly repand, glabrous, above deep green, shining, beneath scarcely paler green, less shining, the chief lateral veins about 5 pairs, like the costa prominent, especially beneath, curved-anastomosing toward margin, the secondaries loosely reticulate, prominulous, especially beneath; smaller leaves of the pairs obovate-oval or suborbicular, short-petioled, 4.5 to 7.5 cm. long, 2.2 to 5.2 cm. wide, usually short-pointed; flowers about 6, in axillary umbelliform racemes, the axis 3 to 6 mm. long, the slender pedicels 12 to 17 mm. long, glabrous, slightly thickened above; calyx cup or saucer-shaped, truncate, glabrous, 3.5 mm. long, 5 to 7 mm. wide, thickish, with thinner margin; corolla bright purple, rotate, 11 mm. long, about 16 mm. wide, the 5 petals united for about one-fourth their length, elliptic-lanceolate, obtuse, 3 to 5-nerved, hook-appendaged at apex within; stamens 5, the flattened filaments 1 mm. long, inserted about 1 mm. above base of corolla, the elliptic-oblong obtuse equal anthers coherent, 6 mm. long, cordate at base, opening by small terminal pores; berry orange, globose, 7 mm. in diameter, many-seeded.

Type in the U. S. National Herbarium, no. 989593, collected on edge of woods, along trail from Hacienda El Limón to El Paraíso, Department of Copán, Honduras, May 12, 1919, by S. F. Blake (no. 7370).

OTHER SPECIMENS EXAMINED:

GUATEMALA: Cubilquitz, Department of Alta Verapaz, altitude 350 meters, May, 1900, *Türckheim* 7637; July, 1907, *Türckheim* II. 59.

Solanum calochromum is related to *S. heteroclitum* Sendtn. and *S. synantherum* Sendtn. The former, however, is described as herbaceous, with corolla 5-fid to middle, calyx subdentate and membranaceous, anthers free, and pedicels 8 mm. long; the latter as with membranaceous leaves, and corolla about an inch wide when flattened out.

Solanum solitarium Blake, sp. nov.

Erectish herb, about 3 meters high; stem greenish, sparsely branched, sparsely incurved-pubescent chiefly in lines; leaves mostly paired, unequal or subequal; petioles slender, 3 to 15 mm. long, flattened and incurved-pubescent above; blades oval-ovate or elliptic-ovate, 3.5 to 11 cm. long, 2 to 5.5 cm. wide, membranaceous, acuminate and often falcate, at base acutely cuneate, slightly decurrent on the petiole, above deep green, incurved-pubescent along the 4 or 5 pairs of lateral veins, sparsely so on surface or glabrous, beneath scarcely paler green, glabrous or rather sparsely incurved-pubescent chiefly along the veins; flowers solitary in the upper axils; pedicels glabrous or very sparsely pubescent, 2.5 to 3.5 cm. long; calyx tube campanulate, 2.5 mm. long, glabrous or very sparsely pubescent, truncate and thin-margined at apex, the 10 herbaceous, narrowly linear, subulate teeth arising just below its apex, glabrous or very sparsely puberulous, 2.5 to 5 mm. long; corolla white, rotate, glabrous, 14 mm. long, 5-lobed for two-fifths its length, the lobes obtuse or apiculate; stamens

5, equal, glabrous, the filaments linear-subulate, 1.2 mm. long, the oblong obtuse cordate-based anthers 6.5 mm. long, opening by small terminal pores; style slender, equaling the stamens.

Type in the U. S. National Herbarium, no. 989602, collected in a clearing, Río Mojanales, Department of Izabal, Guatemala, May 17, 1919, by S. F. Blake (no. 7489). Also collected at the same locality, May 10 to 18, 1919, by H. Pittier (no. 8532).

Solanum solitarium belongs in the group *Lobanthes* of the section *Polymeris*, as the genus is arranged by Dunal in the Prodromus. It is distinguished by the character of its inflorescence and by its flowers.

SCROPHULARIACEAE.

Russelia flavoviridis Blake, sp. nov.

Frutescent, erectish, branched, 1 meter high; stem and branches 6-angled, green, glabrous, 1.5 to 3.5 mm. thick, the internodes 2 to 9 cm. long, marked above with sessile cup-shaped glands; leaves opposite; petioles 1 to 2 mm. long, unmargined, in youth densely barbate-ciliate with white hairs, glabrescent, connected by a whitish or rufescent-ciliate ring; blades suborbicular or rhombic-suborbicular, 1.7 to 2.7 cm. long, 1.5 to 1.8 cm. wide, acute or obtuse, at base truncate-rounded or rounded, rarely subcordate, crenate-serrate above the base with 5 to 7 pairs of deltoid acute or obtuse teeth, coriaceous, above green, shining, along costa and toward base of the 4 or 5 pairs of veins spreading-pilosulous, otherwise glabrous except for the hispidulous-ciliolate margin, beneath pale and usually somewhat yellowish green, glabrous or very sparsely pubescent along the nerves, prominulous-reticulate on both sides and sparsely dotted with sessile cup-shaped glands; panicles axillary, short, about 2.5 cm. long, about 4 to 10-flowered, dotted with cup-shaped glands, otherwise glabrous; pedicels 2 to 5 mm. long; calyx 3 mm. long, dotted with cup-shaped glands, 5-parted, the lance-ovate segments acuminate; corolla tubular, slightly widened above, 12 mm. long, bright red, glabrous outside, rather sparsely pilose within on the ventral side, except on the limb, with unicellular hairs, the upper lip bifid, 2 mm. long, with rounded lobes, the 3 lower lobes cuneate-quadrate, rounded, 3 mm. long; stamens 4, included, the filaments sparsely papillose-pilose at base, 11.5 and 13 mm. long, the staminode 0.8 mm. long; ovary 1.8 mm. long; style 7 mm. long.

Type in the U. S. National Herbarium, no. 989590, collected on an open rocky hillside thinly wooded with pine, along trail from Los Amates to Izabal, Department of Izabal, Guatemala, May 31, 1919, by S. F. Blake (no. 7790).

This species seems to be most nearly allied to *Russelia verticillata* H. B. K., which has 10-angled branches and flowers 16 to 18 mm. long.

BIGNONIACEAE.

Adenocalymna punctifolium Blake, sp. nov.

Vine; stem subterete, slender, striatulate, greenish, densely scurfy puberulous, subglabrate; branches similar, densely crisp-puberulous and scurfy-papillose with griseous or rufescent hairs; leaves opposite, conjugate, the tendril often deciduous or wanting; petioles pubescent like the branches, 1.5 to 3 cm. long; leaflets 2, the petiolules similarly pubescent, 1 to 2 cm. long; blades oblong-ovate or oval-ovate, rather abruptly short-acuminate, at base unequally cordate, 6.5 to 11 cm. long, 3 to 5.5 cm. wide, chartaceous, above deep green, somewhat shining, sparsely pubescent chiefly along the costa and veins with spreading rufescent hairs, finely prominulous-reticulate, beneath duller green, along costa

and veins sparsely puberulous or short-pilose, densely dotted with depressed saucer-shaped translucent glands; tendril when present simple, shorter than the leaves, pubescent like the petioles; flowers in terminal, sessile, about 4-flowered panicles, the pedicels 10 to 12 mm. long, densely rufescent-puberulous, bearing 2 minute deciduous bractlets above the middle; calyx in bud ellipsoid-ovoid, acute, at maturity campanulate, 10 to 13 mm. long, membranaceous-herbaceous, densely rufescent-puberulent and sparsely dotted toward apex with small, saucer-shaped, pale yellowish glands, split into 2 short lobes, the 5 small proper teeth more or less irregularly cohering in groups; corolla 5 cm. long, the tube and throat yellowish cream color and the limb creamy white, papillose-puberulent outside and on limb within, the tube narrowed above, 1.2 cm. long, the narrowly funnelform throat about 2.6 cm. long, the limb about 1.4 cm. long, the 5 lobes broadly oval to broadly obovate-oval, rounded, those of the upper lip somewhat the longer; fertile stamens 4, inserted at base of throat, the glabrous filaments about 1.2 and 1.8 cm. long, the sparsely pubescent, widely divergent anther cells 2.2 mm. long, the connective tipped with 2 short blunt glandlike processes; staminode recurved, about 4 mm. long; disk thick, ring-form, about 1 mm. long; pistil 3 cm. long, the ovary 3 mm. long, densely lepidote, compressed contrary to the partition, the ovules about 40 in each cell, sub-biseriate on each side of the partition; style glabrous, 2.5 cm. long; stigma 2 mm. long.

Type in the U. S. National Herbarium, no. 989627, collected in bushes at Quebradas, Department of Izabal, Guatemala, May 19 to 22, 1919, by H. Pittier (no. 8570). Also collected at the same locality on May 18, 1919, by S. F. Blake (no. 7502).

In its densely punctate leaves this species suggests the genus *Stizophyllum*, but it has a different calyx. It is closely related to *Adenocalymna flos-ardeae* Pittier, of Panama, which has similarly punctate but larger leaves, more densely pubescent on the veins beneath, and a different arrangement of the flowers.

Cydista pubescens Blake, sp. nov.

Shrubby vine; stem stout, subterete, glabrous, grayish-barked; branches dark fuscous, subterete, striatulate, glabrous or very rarely with a few spreading hairs, sparsely scaly-glandular; leaves opposite, conjugate, terminated by a usually persistent tendril; stipules wanting; petioles stoutish, 2.5 to 3.5 cm. long, subterete, spreading-pubescent chiefly on the upper side with dull hairs, and scaly-glandular, in age sometimes glabrate; leaflets 2, the petiolules similar to the petiole, 1.3 to 2.5 cm. long; blades usually suborbicular-ovate, sometimes ovate, 7.5 to 13 cm. long, 4.5 to 11 cm. wide, abruptly short-pointed or acute, the apex obtuse or acute, mucronulate, at base broadly rounded, pergamentaceous to subcoriaceous, deep green, shining above, sparsely spreading-puberulous or pubescent with curved hairs, chiefly along the costa, and scaly-glandular, sub-glabrate, beneath dull, rather densely spreading-pubescent over whole surface or only along the veins with loose, dull, many-celled hairs, and scaly-glandular, prominulous-recticulate on both sides, the chief lateral veins 3 to 5 pairs; tendril glabrous, about as long as the leaflets, simple; panicles in threes terminating stems and branches, trichotomous, scaly-glandular, rather few-flowered, the peduncle 3 to 6 cm. long, the branches erect, the pedicels 7 to 11 mm. long, the bracts spatulate, about 9 mm. long, the bractlets subulate, minute; calyx campanulate, 7 mm. long, minutely 5-toothed at the truncate apex, coriaceous, densely scaly-glandular, obscurely ciliolate; corolla "pinkish white," 4.8 to 6 cm. long, densely papillose-glandular outside and on the limb and within on the ventral surface, the tube 7 to 9 mm. long, the campanulate-funnelform throat

2 to 2.7 cm. long, the limb 1.5 to 2.3 cm. long, the 5 broadly rounded suborbicular lobes somewhat fluted; fertile stamens 4, glabrous, the filaments about 1.2 and 1.8 cm. long, the divergent anther cells 4 mm. long, the linear staminode about 1.2 cm. long; pistil 2.7 cm. long; disk obscure; ovary 4 mm. long, densely scaly-glandular, the ovules in each cell in 2 rows of about 15 each, the style 1.8 to 2 cm. long, the stigmas lobes rhombic-ovate, acute; pod linear, compressed parallel to the partition, 38 to 45 cm. long, 2 cm. wide, scaly-glandular; seeds 6.5 long, 1.5 cm. wide, the entire wings scarious only at apex.

Type in the U. S. National Herbarium, no. 989615, collected at La Florida, Department of Copán, Honduras, May 10, 1919, by H. Pittier (no. 8488).

OTHER SPECIMENS EXAMINED:

TEPIC: Near Acaponeta, July, 1897, *Rose* 1527, 3283.

GUATEMALA: Río de La Paz, Department Jutiapa, altitude 960 meters, July, 1894, *Heyde & Lux* 6363. Barranquillo, Department El Progreso, altitude 545 meters, April, 1920, *Popenoe* 980.

NICARAGUA: Sapoa, Department Rivas, altitude 35 meters, April, 1893, *Shannon* 5049.

COSTA RICA: Liberia, Province Guanacaste, altitude 120 meters, April, 1893, *Shannon* 5048.

PANAMA: Penonomé and vicinity, 1908, *Williams* 228.

This species is close to *Cydista aequinoctialis* (L.) Miers, but may be distinguished by its usually dense pubescence, *C. aequinoctialis* being entirely glabrous. The native name of *C. pubescens* is given as "ito" by Mr. Pittier, and as "campana" by Mr. Popenoe. The specimens here cited, excluding the type, were all distributed as *C. aequinoctialis*, with the exception of no. 6363, which was referred to *Melloa populifolia* Bureau.

Macfadyena guatemalensis Blake, sp. nov.

Shrubby vine; stem subterete, slender, gray-barked, glabrous; leaves opposite, conjugate, the tendril deciduous; stipules obsolete; petioles terete, striatulate, densely griseous-puberulous with spreading hairs, 2.5 to 2.8 cm. long; leaflets 2, the petiolules similar to the petiole, 1.5 cm. long; blades oval, 12 to 14 cm. long, 5 to 6.5 cm. wide, short-acuminate, cuneate-rounded at base, chartaceous, above deep green, somewhat shining, finely puberulous chiefly along the costa, very loosely reticulate with scarcely prominulous veinlets, beneath dull green, evenly but not densely pubescent with spreading whitish hairs, the whitish lateral veins about 6 pairs, prominent, the prominulous secondaries very loosely reticulate; tendril not seen; inflorescence of one or two about 8-flowered racemes terminating a lateral branchlet, the axis 1 to 1.5 cm. long, sparsely pubescent, the persistent bractlets subulate, about 1.5 mm. long; pedicels glabrous, 10 mm. long; calyx campanulate, 15 to 19 mm. long, thin, coriaceous, dark green, glabrous, split half its length on the lower side, bearing a few saucer-shaped glands at base; corolla yellow, drying blackish green, 5.5 to 6 cm. long, thin-coriaceous, glabrous, the tube 1.5 cm. long, narrowed above, the funnelform throat 3 to 3.5 cm. long, the limb 1 to 1.5 cm. long, the 5 lobes depressed-orbicular, broadly rounded, plane; fertile stamens 4, glabrous, the thickish filaments about 1.6 and 2.4 cm. long, the widely divergent anther cells 3.5 mm. long, the slender lanceolate-tipped staminode about 6 mm. long; disk thick, cupuliform, about 2 mm. high; pistil 4 cm. long; ovary slenderly ovoid, 5 mm. long, densely lepidote, compressed parallel to the partition, the ovules in about 6 pairs in each cell, definitely 1-rowed on each side of placenta.

Type in the U. S. National Herbarium, no. 989601, collected along the bank of the Río Izabal, Izabal, Department of Izabal, Guatemala, June 1, 1919, by S. F. Blake (no. 7845).

Macfadyena guatemalensis is apparently the first true member of the genus to be reported from north of the Isthmus of Panama. It seems from description to be most closely allied to *M. mollis* (Sond.) Seem., but differs in its glabrous pedicels and corolla, and in various other characters.

ACANTHACEAE.

Siphonoglossa discolor Blake, sp. nov.

Herbaceous perennial, the stems several, branched, ascending, about 45 cm. long and 1.5 mm. thick, dull green, terete, sulcate, obscurely puberulous with incurved hairs, the internodes of the main stems 2 to 6.5 cm. long; leaves opposite; petioles slender, naked, puberulous, 3 to 5 mm. long; blades obovate, spatulate-obovate, rotund-obovate, or rarely elliptic, 11 to 22 mm. long, 6 to 11 mm. wide, broadly rounded, obtuse, or rarely acutish, apiculate, at base acutely cuneate, herbaceous-papyraceous, entire, sometimes somewhat repand, above deep green, in youth somewhat pubescent, in maturity glabrate except for the hispidulous-ciliolate margin and the sometimes pubescent costa, beneath paler and yellowish-green, permanently hispidulous-pilosulous chiefly along the veins, cystolithigerous on both sides, the lateral veins about 3 pairs, obscure above, prominulous beneath; flowers in twos or threes in the axils of foliage leaves, subsessile; bractlets 2, lance-subulate, incurved-puberulous and ciliolate, 2 mm. long; calyx 4-parted, the segments lance-linear-subulate, equal, 4 mm. long, ciliolate and puberulous; corolla magenta, 2.4 cm. long, spreading-pilosulous throughout, sparsely so toward apex of limb, the slender cylindric tube 16 mm. long, about 0.8 mm. in diameter, the throat short, about 2 mm. long, somewhat ampliate, the oblong-ovate obtuse porrect upper lip 6 mm. long, about 2 mm. wide, the spreading lower lip 6.5 mm. long, about 10 mm. wide, 3-lobed, the lobes obovate-oval, rounded, subequal, 5 mm. long, 3.3 mm. wide; stamens 2, inserted at apex of throat, the glabrous filaments 3 mm. long, the connective somewhat dilated, the elliptic-oblong glabrous anther cells unequal, subparallel, oppositely inserted, obtuse at both ends, unequal, 0.8 to 0.9 and 1.1 to 1.2 mm. long; disk prominent, fleshy, cup-shaped, about 0.3 mm. high, subentire; ovary 1.2 mm. long, cylindric-ovoid, pilosulous above, 2-celled, with 2 ovules in each cell; style slender, pilosulous to above the middle, 2 cm. long; capsule clavate, spreading-puberulous, 1 cm. long, 4-seeded, the sterile stipelike base nearly equaling the fertile portion; seeds brownish, suborbicular, flattened, verrucose, 2.5 mm. long.

Type in the U. S. National Herbarium, no. 989619, collected on edge of thicket at Gualán, Department of Zacapa, Guatemala, May 26, 1919, by S. F. Blake (no. 7669).

This species may be recognized by its obovate discolorous leaves and fine puberulence.

Dianthera riparia Blake, sp. nov.

Erect perennial herb, 60 to 70 cm. high, sparsely branched; stem slender, dark green, pilose or pilosulous in lines with spreading or recurved hairs; leaves opposite; petioles slender, glabrous, barely margined, 4 to 13 mm. long; blades elliptic or lance-elliptic, 9 to 14 cm. long, 2 to 4 cm. wide, attenuate and usually falcate, at base acuminte into the petiole, repand, membranous, glabrous and cystolithigerous on both sides, deep green above, slightly paler green beneath, the costa sulcate above, prominent beneath, the 4 or 5 pairs of lateral veins curved-anastomosing at tip, prominulous especially beneath; spikes axillary and solitary, few, borne near tip of stem, pilose or pilosulous in lines, very slender, 12 to 17 cm. long, on a peduncle 4 cm. long or less, the internodes

1 cm. long, the flowers opposite at the nodes; bracts lance-subulate, attenuate from an ovate, sparsely ciliate base, 3 mm. long; bractlets 2, similar but narrower and not ciliate, slightly shorter; sepals 4, lance-linear-subulate, attenuate, sparsely ciliolate or subglabrous, 5.5 mm. long; corolla glabrous, 17 mm. long, white, the lip marked or lined with violet or magenta-purple, the upper lip pale magenta within, the tube 9 mm. long, the upper lip ovate, obtuse, obtusely bidenticulate, 6 mm. long, 2.5 to 3.5 mm. wide, the lower lip 8.5 mm. long, 6.5 to 8 mm. wide, bearing 2 longitudinal folds about 1.2 mm. high, its 3 rounded subequal lobes about 2 mm. long; stamens 2, inserted at apex of tube, the glabrous filaments 4 mm. long, the connective strongly and obliquely dilated, the anther cells very oblique, obtuse at each end, glabrous, the lower 0.8 mm. long, the upper 1 mm. long; capsule 4-seeded, glabrous, 12 mm. long, about 1.5 mm. wide, the stipe equaling the fertile portion; seeds brownish black, papillose, 2.2 mm. long.

Type in the U. S. National Herbarium, no. 989620, collected along stream on trail from Los Amates to Izabal, Department of Izabal, Guatemala, May 31, 1919, by S. F. Blake (no. 7800).

ADDITIONAL SPECIMEN EXAMINED:

GUATEMALA: Thickets along Río Techín, Department of Izabal, May 17, 1919, *Blake* 7491.

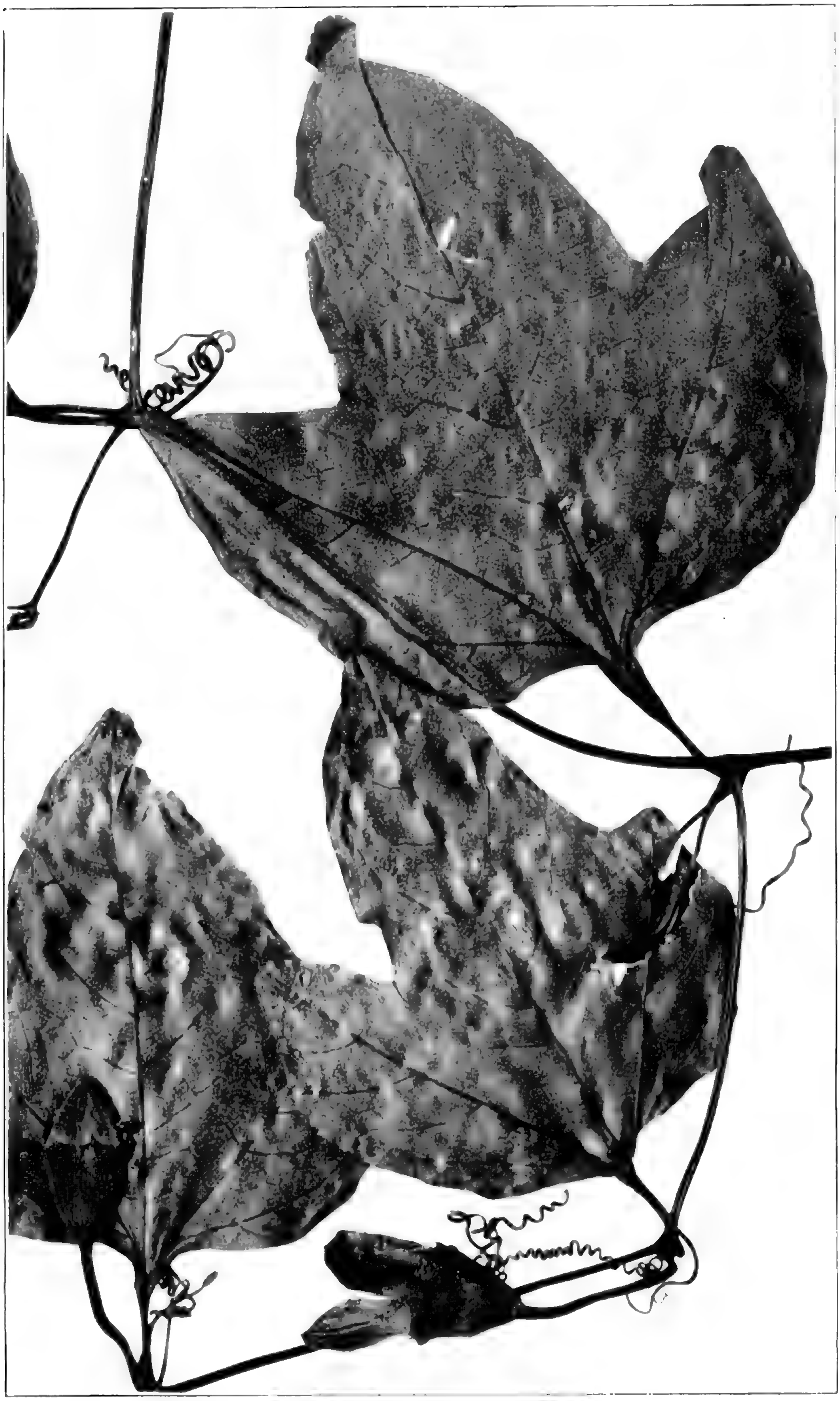
This species is closely related to *Dianthera breviflora* (Nees) Hemsl., which is described as having broader leaves with 8 or 9 pairs of lateral veins, rather dense subsessile spike, glabrous bracts, bractlets, and calyx, and smaller carolla, with the sepals (6 mm. long) equaling the corolla tube. Dr. Stapf writes me that the type (*Linden* 184) of *Rhytiglossa breviflora* Nees, in the Kew Herbarium, has a corolla measuring 15 mm. to the tip of the ventral lip, 12 mm. to the tip of the dorsal lip, with the glabrous tube 5 mm. long.

CUCURBITACEAE.

Anguria aurantiaca Blake, sp. nov.

Herbaceous twiner; stem fuscous, striate, about 3 mm. thick, finely spreading-puberulous; tendrils opposite the leaves, spreading-puberulous, glabrescent; leaves alternate, trifoliolate; petioles stoutish, finely spreading-puberulous, 5 to 5.5 cm. long; petiolules naked, 4 to 7 mm. long; blades of the lateral leaflets obliquely broad-ovate, 2-parted nearly to base, the lower lobe ovate, strongly inequilateral, acute or short-acuminate, broadly rounded on lower side and there with a blunt tooth toward the base, otherwise subentire, 7 to 9 cm. long, 3.5 to 4 cm. wide, above dull green, glabrous, pustulose along the nerves, beneath somewhat paler green, obscurely puberulous along the nerves, the upper lobe subequilateral, 11.5 to 13.5 cm. long, 5 to 6 cm. wide, with a large tooth on the lower side near middle and slightly sinuate-denticulate; middle leaflet rhombic-obovate, 13 to 14.5 cm. long, 5.5 to 7 cm. wide, short-acuminate, cuneate at base, sinuate-denticulate, equilateral, the lateral veins about 6 pairs, prominulous on both sides; peduncle of the staminate spike axillary, slender, striate, essentially glabrous, 20 cm. long; staminate spike about 18-flowered, its axis 5 to 7 mm. long; flowers sessile; calyx oblong-cylindric, glabrous, the tube 11 mm. long, about 2.5 mm. thick, the 5 triangular acute teeth 2 mm. long; petals 5, orange, rhombic-obovate to rhombic-suborbicular, 4 mm. long, 3.5 mm. wide, densely puberulous on both sides; stamens 2, linear-elliptic, 7.5 mm. long, straight, dorsally affixed, the papillose obtuse appendage about 0.2 mm. long.

Type in the U. S. National Herbarium, no. 989585, collected on edge of trail from Hacienda El Limón to El Paraíso, Department of Copán, Honduras, May 12, 1919, by S. F. Blake (no. 7355).



CAYAPONIA MICRODONTA BLAKE.

SCLEROCARPUS PHYLLOCEPHALUS BLAKE.

This species enters the third group of the genus in Cogniaux's monograph, and is readily distinguished by its very small petals and the dimensions of its leaves and calyx.

Cayaponia microdonta Blake, sp. nov. – PLATE 7.

Twining herb; stem slender, about 1.5 mm. thick, striate-angled, densely and finely glandular-tuberculate, sparsely branched; tendrils opposite the leaves, slender, striate-angled, about 10 cm. long; leaves alternate; petioles striate, marginate above, finely subglandular-papillose, the naked portion 1 cm. long; blades broadly ovate in outline, 3-lobed about to middle, 7 to 10 cm. long, 6.5 to 8.5 cm. wide, at base broadly rounded and narrowly decurrent into the petiole for about 3 to 10 mm., the lobes obtuse or emarginulate and often mucronulate, the blade papyraceous, above deep green and slightly shining, evenly papillose-tuberculate and hispidulous with soon deciduous hairs, along the nerves tuberculate-hispidulous, beneath scarcely paler green, densely papillose-tuberculate and glanduliferous, along the veins very sparsely hispidulous, the free portions of the lobes ovate, obscurely denticulate, the lateral lobes about 2 cm. long and wide or rarely obsolescent, the terminal about 6 cm. long, 3.2 to 4 cm. wide, the decurrent portion of the blade marked with large crater-shaped glands; staminate flowers solitary in the axils, on striate, obscurely tuberculate peduncles 2 to 3.5 cm. long; calyx campanulate, the tube 14 mm. long, 12 mm. wide, puberulous in a ring at extreme base, sparsely tuberculate-hispidulous, outside hispidulous-ciliolate, long-pilose within, the 5 triangular acute teeth 1.5 mm. high; corolla cream-color with yellow center, the 5 petals inserted near the apex of the calyx tube, oblong-oval or obovate-oval, 15 mm. long, 8 mm. wide, densely and sordidly papillose-puberulous with subglandular hairs on both sides, long-pilose toward base within; stamens 3, the pilose filaments about 4 mm. long, the reduplicate connate anthers 11 mm. long, the connectives prolonged into oblong obtuse pilose appendages about 2 mm. long; ovary rudiment none.

Type in the U. S. National Herbarium, no. 989625, collected on edge of woods, Los Amates, Department of Izabal, Guatemala, May 29, 1919, by S. F. Blake (no. 7730).

Closest to *Cayaponia macrantha* Pittier, of Costa Rica, which has more deeply lobed leaves with more sinuate margin, longer peduncles, and calyx teeth 2 to 3 mm. long.

EXPLANATION OF PLATE 7.—*Cayaponia microdonta*, from the type specimen. Natural size.

ASTERACEAE.

Sclerocarpus phyllocephalus Blake, sp. nov. PLATE 8.

Erect annual with assurgent branches, or assurgent, 16 to 32 cm. long, the branches sometimes exceeding the main stem, opposite below, alternate above, like the stem greenish or fuscous, in youth densely hispid-pilose with spreading subtuberculate-based hairs, in age subglabrescent; leaves opposite below, alternate above; petioles hispid-pilose with ascending or somewhat spreading hairs, naked or slightly margined, 5 to 25 mm. long; blades ovate or lance-ovate, 2 to 8 cm. long, 1 to 4 cm. wide, acuminate, at base cuneately narrowed into the petiole, serrate with 6 to 12 pairs of obtusish, often depressed teeth, above dull green, rather densely hispid-pilose with ascending roughish hairs, beneath in youth densely subappressed-hispid-pilose with flavescent-griseous hairs, at maturity griseous; heads solitary at tips of stem and branches, 11 to 16 mm. wide, on peduncles 1 to 11.5 cm. long; involucre of 6 very unequal, 1-seriate, foliaceous, spatulate to oblong-ovate, entire or serrate, petiolulate phyllaries, 6 to 20 mm. long, 1.8 to 7 mm. wide; involucre subtended at base by 2 or 3 ovate serrate

bracts up to 5 cm. long, precisely similar to the leaves; rays 6, neutral, orange or orange-yellow, the pubescent tube 2 mm. long, the suborbicular emarginate limb 4 to 6.5 mm. long, 4 to 5 mm. wide; disk fertile, the corollas orange or orange-yellow, 6.8 to 8.5 mm. long, slender-funnelform, hispid-pilose above, the teeth lanceolate, 2 mm. long, bearing a tuft of deeper-colored hairs within near the apex; fruits all beaked, strigillose, bent, 6 mm. long, the body obovoid, 3.5 to 4 mm. long, ribbed and bluntly tubercled on the back and sides, the beak about 2 mm. long; achene obliquely obovoid, 3 to 3.5 mm. long, glabrous, dark grayish, striate, epappose.

Type in the U. S. National Herbarium, no. 989587, collected on railroad embankment at Cristina, Department of Izabal, Guatemala, May 23, 1919, by S. F. Blake (no. 7648). Also collected at the same place and date under no. 7642.

This new species is most closely related to *Sclerocarpus major* Small, which has pappose achenes, rays with lamina 1.8 to 2 cm. long, and corolla teeth 5 mm. long. It is at once distinguished from *S. divaricatus* (Benth.) Benth. & Hook. and *S. orcuttii* Greenm. by the fact that all its fruits are beaked, while in these species the outer fruits are not beaked although sometimes hooded.

EXPLANATION OF PLATE 8.—*Sclerocarpus phyllocephalus*, from the type specimen. Natural size.

Wedelia parviceps Blake, sp. nov. PLATE 9.

Suffrutescent or frutescent, or sometimes herbaceous, erect or ascending, usually much branched, 0.6 to 1.3 meters high, from a tuberous-thickened root 1 to 1.5 cm. thick; stem and branches slender, densely and harshly tuberculate-hispidulous, glandular and usually spreading-hispid; leaves opposite throughout; petioles tuberculate-hispid and hispidulous, naked, 2 to 6 mm. long; blades lance-ovate to elliptic-ovate or ovate, 2 to 6 cm. long, 8 to 20 mm. wide (those of the branches smaller), acute or acuminate, cuneate or rounded-cuneate at base, serrulate with 6 to 10 pairs of depressed obtuse or acute teeth or subentire, firmly herbaceous, above dull green, evenly and harshly hispidulous and ascending-hispid, the larger hairs tuberculate-based, beneath slightly paler green, evenly hispidulous on the surface, on the veins ascending-hispid, triplinerved; heads 10 mm. wide, solitary or usually in threes, axillary and terminal, on densely hispidulous and more sparsely spreading-hispid pedicels 1 to 4.5 cm. long; disk campanulate, 6 to 7 mm. high, 3 to 5 mm. wide; involucre 3.5 to 6 mm. high, 3 or 4-seriate, subequal or graduated, ascending-hispid-pilose and ciliate, the phyllaries with indurate base and shorter, rather abruptly narrower, obtuse or acutish, somewhat spreading, herbaceous tips; rays 6, yellow, fertile, obtusely bidentate, the lamina oval, hispidulous dorsally, 4 mm. long, 2.5 mm. wide; disk flowers about 9, the corollas yellow, hispid at apex of tube, hispidulous on the teeth, 4 mm. long (tube 1.3 mm., throat narrow-funnelform, 1.9 mm., teeth 0.8 mm.); pales obtuse, scarious, hispidulous above, 5 mm. long; ray achenes with denticulate coroniform pappus cup 0.5 mm. high; disk achenes oblong, thickened but somewhat compressed, 4-angled, grayish, glabrous, 3.5 mm. long, 2.3 mm. wide; pappus a narrow denticulate cup 0.5 mm. high, in the ovary provided on the inner side with an awn or tooth 1 mm. high or less, this lost at maturity.

Type in the U. S. National Herbarium, no. 989584, collected on dried river's edge at Gualán, Department of Zacapa, Guatemala, May 26, 1919, by S. F. Blake (no. 7681).

OTHER SPECIMENS EXAMINED:

GUATEMALA: Open hillsides wooded with pine, along trail from Los Amates to Izabal, May 31, 1919, *Blake* 7782. Secanquím, March 29, 1902, *Cook & Griggs* 301. Near Secaquím, trail to Cahabón, November 25, 1904, *Goll* 53.

WEDELIA PARVICEPS BLAKE.

HONDURAS: Open hillsides wooded with pine, along trail from La Florida to Hacienda Espíritu Santo, Department of Copán, May 14, 1919, *Blake* 7426.

NICARAGUA: In pine woods, San Rafael del Norte, altitude 1,200 to 1,350 meters, March 25 or 26, 1917, *Miller & Griscom* 59, 92, 94.

PANAMA: Common in pastures around El Boquete, Chiriquí, altitude 1,000 to 1,300 meters, March 2, 1911, *Pittier* 2867. In savannas, Cerro Vaca, eastern Chiriquí, altitude 900 to 1,136 meters, December 25 to 28, 1911, *Pittier* 4346.

Wedelia parviceps is easily distinguished by its very small heads.

EXPLANATION OF PLATE 9.—*Wedelia parviceps*, from *Blake* 7426. Nearly natural size.

Melanthera hastifolia Blake, sp. nov. FIGURE 3.

Erect or ascending, herbaceous, branched, about 2.5 meters high; stem stout, 7 mm. thick, subquadrangular, striate, whitish, immaculate, strigillose; leaves opposite; petioles slender, naked, strigose and sparsely hispid, connected at base by a hispidulous ring, those of the main stem leaves 2 to 2.5 cm. long, those of the branch leaves 1 cm. long; blades of the stem leaves oblong-obovate or oblong, widest at base and there with a spreading hastate lobe on each side, contracted above the lobes and then widened, 9 to 11 cm. long, 3.5 to 5 cm. wide at base across the lobes, 2 to 3 cm. wide above the middle, acuminate, at base subtruncate, then shortly cuneate into the petiole, irregularly serrate-dentate with 20 to 30 pairs of triangular acute teeth, above deep green, slightly lucid, harshly tuberculate-hispidulous and along the veins ascending-hispid, beneath slightly paler green, hispidulous with incurved-ascending hairs and along the veins ascending-hispid, pinnate-veined, the costa and the 8 or 9 pairs of curved-anastomosing lateral veins and the secondaries prominulous-reticulate beneath; branch leaves similar but smaller and often not hastate at base, the blades 4 to 6.5 cm. long, 1 to 1.5 cm. wide; peduncles axillary and terminal, striate, strigillose, 4 to 9 cm. long, or rarely very short; heads 15 mm. wide in flower, 7 mm. high, in fruit 11 to 12 mm. wide, 7 mm. high; involucre 3-seriate, equal or subequal, 4.5 to 5 mm. high, the phyllaries oblong-ovate, acute, 1.5 to 2 mm. wide, densely strigose and more or less hispidciliate, appressed, indurate and pale below, the upper half or only the tip subherbaceous; rays none; disk corollas white, tuberculate-hispidulous on the teeth, 5.5 mm. long (tube 1.2 mm., throat 3 mm., teeth triangular, 1.3 mm.); pales abruptly acuminate, strigillose and dull greenish above, 5.5 to 6.5 mm. long; achenes plump-obovoid, subquadrangular, 2.5 mm. long, blackish, hispidulous at apex; awns 2 or 3, unequal, 0.5 to 2 mm. long, caducous; squamellaceous corona obscure.

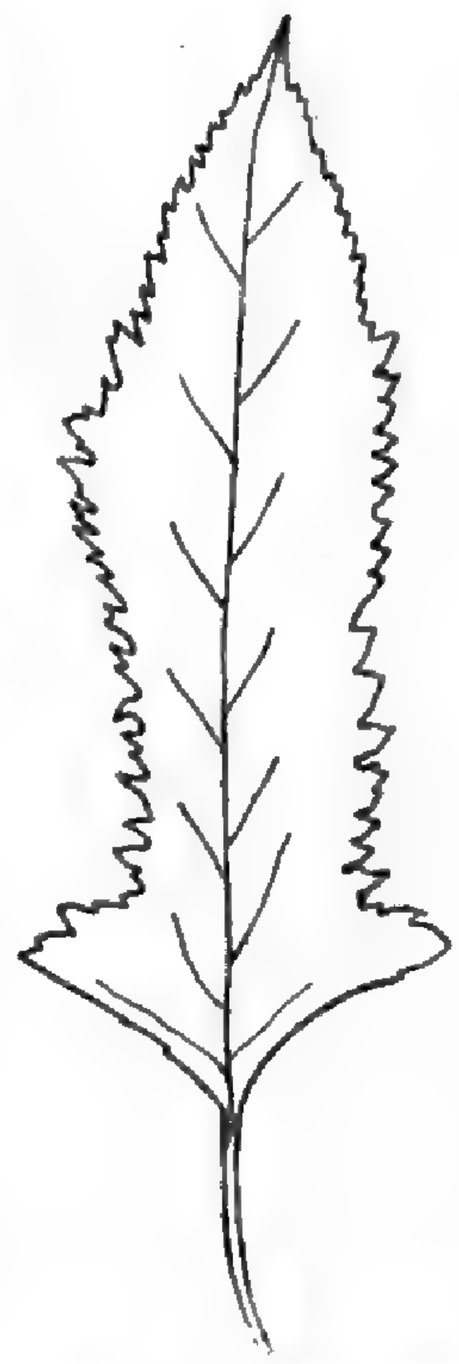


FIG. 3.—*Melanthera hastifolia*. A leaf of the type specimen. One-half natural size.

Type in the U. S. National Herbarium, no. 989633, collected in ditch along railroad at Cristina, Department of Izabal, Guatemala, May 22, 1919, by S. F. Blake (no. 7601A).

I refer also to this species, but with some doubt, a collection made at the same place and date (no. 7588), in which the leaves are lanceolate or elliptic-lanceolate, obscurely or not hastate, and not contracted above the base. These plants bear the vernacular name "flor de la vida."

Melanthera hastifolia is allied to *M. nivea* (L.) Small, but may be distinguished by its foliar characters.

Melanthera linearis Blake, sp. nov. FIGURE 4.

Erect or ascending herbaceous perennial, 1 meter high, sparsely branched, the stem slender, about 2.5 mm. thick, quadrangular, purplish-maculate, strigillose; leaves opposite, alternate in the inflorescence; petioles slender, unmargined, strigillose, those of the main leaves 5 to 10 mm. long; blades linear or the lower narrowly linear-oblanceolate, 5 to 9 cm. long, 4 to 7 mm. wide, acute at each end, serrate with 8 to 19 pairs of appressed obtuse teeth, above dark dull green, tuberculate-strigillose, beneath somewhat paler green, evenly but not densely strigillose, along the costa and the 6 to 13 pairs of slightly prominulous lateral veins short-hispid with barely ascending hairs; peduncles few, solitary in the axils and terminal, strigillose, slender, naked or 1-bracteolate, 6 to 14.5 cm. long; disk 12 mm. wide in flower, 6 mm. high, in fruit 6 mm. high, 9 mm. in diameter; involucre about 3-seriate, 3 to 3.5 mm. high, graduated, the phyllaries oval, obtuse or rounded, obscurely mucronulate, appressed, griseous-strigillose, indurate, with short subherbaceous tip; rays none; disk corollas white, tuberculate-hispidulous above, 4 mm. long (tube 0.7 mm., throat 2.6 mm., teeth triangular, 0.7 mm.); pales strigillose, barely acute, 3.5 mm. long; achenes plump, blackish, 2.2 mm. long, essentially glabrous; awns 2, unequal, caducous, 0.8 to 1.7 mm. long; squamellae obscure.

FIG. 4.—*Melanthera linearis*. A leaf of the type specimen. One-half natural size.

Type in the U. S. National Herbarium, no. 989632, collected in ditch along railroad at Cristina, Department of Izabal, Guatemala, May 22, 1919, by S. F. Blake (no. 7601).

This species is related to *Melanthera angustifolia* A. Rich., but is to be separated by its smaller heads with shorter blunt phyllaries and pales.

Otopappus asperulus Blake, sp. nov. PLATE 10.

Slender scandent shrub; stem terete, striatulate, about 2 mm. thick, grayish, densely and harshly tuberculate-hispidulous with spreading hairs, subglabrate; branches fuscous, very densely and harshly spreading-hispidulous; leaves opposite; petioles 2 to 3 mm. long, spreading-short-hispid; blades ovate-lanceolate, 5.5 to 8 cm. long, 1.2 to 2.5 cm. wide, acuminate, often somewhat falcate, at base rounded, serrulate with 5 to 13 pairs of depressed mucronulate teeth, subpapyraceous, above dark dull green, rather sparsely and harshly hispidulous and short-hispid with lepidote-based ascending hairs, glabrescent, beneath rather sparsely hispidulous and short-hispid with mostly tuberculate-based hairs, these longer along the veins, triplinerved from near the base, the veins impressed above, like the secondaries prominulous beneath; heads about 12 mm. wide, campanulate, in axillary and terminal corymbs of 2 to 4, mostly shorter than the leaves; bracts spatulate, about 6 mm. long; pedicels densely hispidulous, usually about 5 mm. long, rarely up to 1 cm. long; disk in fruit 8 mm. high, about 10 mm. wide; involucre 5 mm. high, about 5-seriate, graduated, griseous-strigillose, the 2 or 3 outer series of phyllaries narrowly oblong, indurate, with reflexed spatulate herbaceous tips 0.8 to 3 mm. long, the inner indurate, oblong or oblong-oval, obtuse, appressed; rays 10, fertile, yellow, the lamina elliptic, 4 to 4.5 mm. long, 1 to 1.2 mm. wide, 3-dentate, hispidulous on nerves and teeth; disk corollas yellow, hispidulous on tube and teeth, 5 mm. long (tube 1.5 mm., teeth 0.8 mm.); pales acuminate, stiff, persistent hispidulous on back and above, 6 to 7 mm. long; disk achenes black, obovoid compressed, striate, 3 to 3.5 mm. long, 1 mm. wide, narrowly white-winged on one side (wing about 0.2 mm. wide), broadly winged above on the other

OTOPAPPUS ASPERULUS BLAKE.

(wing 1 mm. wide), the wings united with the pappus, the narrower passing into a slender free awn 1 mm. long, the broader adnate throughout its length to an awn 2.8 mm. long; pappus corona denticulate, 1 mm. high, of completely united squamellae, adnate to the awns of the pappus.

Type in the U. S. National Herbarium, no. 989617, collected along banks of brook, Hacienda La Zumbadora, between El Paraíso and La Florida, Department of Copán, Honduras, May 13, 1919, by S. F. Blake (no. 7400).

This species is easily distinguished by its fine harsh pubescence and by the shape of its leaves.

EXPLANATION OF PLATE 10.—*Otopappus asperulus*, from the type specimen. Natural size.

Liabum subglandulare Blake, sp. nov.

Shrub 3 meters high; stem stout, oppositely branched, 8 mm. thick above, grayish, densely sordid-puberulous with spreading hairs, subglabrescent; young branches densely and sordidly tomentose-puberulous; leaves opposite; petioles slender, naked, sordid-puberulous especially beneath, 1.5 to 2.5 cm. long; blades (immature) ovate or lance-ovate, 5 to 8 cm. long, 2.5 to 3.5 cm. wide, acuminate, cuneately narrowed into the petiole, subentire or obscurely repand-denticulate, subchartaceous, above deep dull green, evenly hispidulous-puberulous with subglandular-based hairs but scarcely roughish, ciliolate with subglandular hairs, beneath griseous-canescently arachnoid-pilose and beneath the hairs densely glandular-puberulous with lucid brownish glands, glandular-pubescent along the veins, 3-nerved above the base and loosely venose below, the veins scarcely prominulous; panicles terminating branches, rounded-obovoid, densely many-headed, 13 cm. long, 10 cm. wide, sordidly griseous-tomentulose-puberulous and more sparsely pilosulous with straight hairs; pedicels 1 mm. long or less; involucre 3.5 to 4 mm. high, the phyllaries very few (about 10), about 4-seriate, strongly graduated, the outermost roundish, dull brownish, sordid-pilosulous above, the innermost oblong-oval, obtuse, dull brownish with thinner paler margins, sparsely pilosulous and subglandular especially toward apex; heads in fruit about 8 mm. wide; rays none; disk flowers 5 or 6; corollas creamy, 8.5 mm. long, the teeth papillose-barbate at apex, lanceolate, 3 mm. long; achenes hispidulous, 2 mm. long; pappus straw-color, the outer bristles squamelliform, 1 mm. long, the others aristiform, 7 mm. long.

Type in the U. S. National Herbarium, no. 989583, collected in shrubby ground, Hacienda La Zumbadora, between El Paraíso and La Florida, Department of Copán, Honduras, May 13, 1919, by S. F. Blake (no. 7386).

Liabum subglandulare is related to *L. caducifolium* and *L. deamii* Robins. & Bartl. It is distinguished from the former by its obtuse phyllaries and densely subglandular-puberulous stem; from the latter by its dense coating of glandular or subglandular hairs and by the lack of floccose pubescence.

Hieracium hondurense Blake, sp. nov.

Herbaceous perennial, erect, about 50 cm. high; stems one or two, slender, at base loosely spreading-pilose, elsewhere rather densely appressed or ascending-puberulous, more densely puberulous on the branches of the panicle and there sparsely stipitate-glandular with dark glands on yellowish hairs about 0.2 mm. long; basal leaves about 3 to 6, obovate or elliptic-oblong, 4.5 to 6 cm. long (including the narrowed petiole-like base), 1.5 to 2.5 cm. wide, obtuse, mucronulate, cuneate at base, thin, callous-denticulate, above sparsely long-pilose with loose white hairs, beneath spreading-pilose chiefly along the costa; stem leaves 2 to 4, the lower oblong or obovate, sessile or subsessile, similar to the basal leaves, 4 to 7 cm. long, 8 to 25 mm. wide, the upper one or two linear or elliptic-linear, 2 to 3.2 cm. long, 1.5 to 5 mm. wide; stems bearing flowering branches from about the middle, the heads about 15 to 30, loosely panicled, the pedicels

1 to 2.8 cm. long, griseous-puberulous and not densely stipitate-glandular; heads yellow, 1 cm. wide, the styles dark; involucre cylindric-oblong, 8 to 9 mm. high, toward base slightly griseous-puberulous and sparsely stipitate-glandular, the bracts colorate at apex; achenes purplish brown, 3.2 mm. long, striate, glabrous, rather abruptly contracted into a neck 0.7 mm. long; pappus dirty-white, 5 mm. long.

Type in the U. S. National Herbarium, no. 989581, collected on open hillside wooded with pine, along trail from La Florida to Hacienda Espíritu Santo, Department of Copán, Honduras, May 14, 1919, by S. F. Blake (no. 7423).

ADDITIONAL SPECIMEN EXAMINED:

HONDURAS: Open hillside wooded with pine, Hacienda Espíritu Santo, May 15, 1919, *Blake* 7434.

This species is closest to *Hieracium comatum* Fries, which has a much hairier stem, thicker leaves, considerably shorter involucre, and smaller achenes, these not conspicuously contracted above into a neck.

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STUDIES OF TROPICAL AMERICAN FERNS—No. 7

By WILLIAM R. MAXON

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II

PREFACE.

The present paper, by Mr. William R. Maxon, Associate Curator of the National Herbarium, is the seventh of a series begun in volume 10 of the Contributions, in 1908, placing on record results of his studies of tropical American ferns. Of special interest are the revision of a difficult subgroup of tree ferns of the genus *Alsophila*, and the description of a curious new genus of dryopteroid ferns from the West Indies, *Atalopteris*.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

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STUDIES OF TROPICAL AMERICAN FERNS—NO. 7.

By William R. Maxon.

INTRODUCTION.

In the following paper are brought together additional results of the writer's studies of tropical American ferns, of which six installments have been published under the same title in earlier numbers of the Contributions, beginning with volume 10.

THE NORTH AMERICAN SPECIES OF ALSOPHILA GROUPED WITH A. ARMATA.

The North American tree ferns of the genus *Alsophila* which are related to the species known usually as *A. armata* are limited by Hooker and Baker in the Synopsis Filicum to the following: *Alsophila ferox* Presl, which is said to be spread throughout the whole of tropical America; *A. armata* (Swartz) Presl, of similar distribution, *A. bicrenata* (Liebm.) Fourn. being cited at a synonym; *A. godmani* Hook., described as a new species from Guatemala; *A. mexicana* Mart., ascribed only to Mexico, with a short abridged description and a citation of Martius's excellent illustration; and, finally, *A. myosuroides* Liebm., with a brief paraphrase of Liebmann's description and the following remarkable comment: "The author seems to allude to an affinity with *Als. armata, Pr.* I possess copious specimens from Dr. Liebmann gathered in Mexico, and from the Copenhagen Garden, where it is cultivated, but, save in the caudate apices of the pinnules, it possesses scarcely any distinguishing characters."

Of the species just mentioned, *A. ferox* is universally regarded as valid, but under the name *A. microdonta* Desv.; *A. armata* (Swartz) Presl is likewise valid, though to be known as *A. swartziana*, under the American Code; *A. bicrenata*, confined to Mexico, is entirely valid and is so cited by Christensen; *A. godmani* is identical with *A. mexicana*, as should have been readily apparent from Martius's plate and critical notes; and *A. myosuroides* is an extremely well marked species since found to have a wide range in the lowlands from southern Mexico to Honduras and in western Cuba.

The list of valid species in this group has been increased by Christ, who about 15 years ago described *Alsophila stipularis*, *A. ichtyolepis*, and *A. acutidens*, all from Costa Rica. The last is very distinct, and is well described from three collections at a single locality. *Alsophila stipularis* also proves to be valid, athough the original description, drawn from specimens lacking precise data, is short and comparative. *Alsophila ichtyolepis*, described from four collections, is almost completely synonymous with *A. stipularis*.

The present review is based upon studies carried out at intervals for several years past. One species, *A. scabriuscula*, has been described by the writer in the meantime from Guatemala and Mexico. Five are now described as new: *A. notabilis* and *A. nesiotica*, from Cocos Island, off the west coast of Costa Rica: *A. trichiata*, from Panama and Costa Rica; *A. pansamalana*, from Alta Verapaz; and *A. strigillosa*, which is apparently a very rare Cuban plant. Several of these are figured.

The group of *A. armata*, which is fairly well marked, is made up of species which, as is usually true in the tree ferns, have definite, rather restricted ranges and which to be well understood or properly described must be studied in comparison with each other. In addition to the gross characters common to the group they possess minute but distinctive differences in cutting and in the character and disposition of scales and hairy covering, whose value for purposes of classification may otherwise be overlooked.

The general characters hardly need extensive description. The blades are not quite tripinnate, the pinnules mostly being cut to about 1 mm. from the costa. The segments, which range from oblong to linear and from nearly straight to falcate, are thus joined at their dilatate base, the acutish, polygonal, or sometimes subquadrate sinuses often having a translucent yellowish callus at their middle. In cutting, the segments range from serrate or crenate-serrate to incised or even truly pinnatifid, and the margins of the various-sized teeth or lobes differ similarly, though not to the same degree. The branching of the veins shows great diversity, and in consequence the position of the sori with respect to the costule. Characters afforded by the paraphyses are both diverse and dependable.

In hairiness, the vascular parts, from the primary rachis to the ultimate veins, are remarkably constant for a given species. In some species the hairs of the primary rachis are at first so close-set as to cover the surface completely, and yet are so completely detergible with age, or upon abrasion, as to leave no trace whatever upon the lustrous surface, which is absolutely smooth to the touch. In others, with stiffer hairs, the surface of the rachis never becomes smooth to the touch, even at extreme age, but is invariably scabrous from the persistence of the inflated tuberculate bases of the hairs. Hairs of

the inflated septate type are common to the secondary rachises, costae, and costules of all (excepting *A. strigillosa*, in part), and differ greatly in abundance, color, length, rigidity, and thickness. Many of these differences are indicated in the key. *Alsophila microdonta* is the only included species with distinctly spiny secondary rachises.

KEY TO SPECIES.

Primary rachis strongly aculeate throughout; secondary rachis also aculeate, the spines slender, up to 5 mm. long. Paraphyses very numerous, flaccid, moniliform, persistent in a lax tuft----------**1. A. microdonta.**

Primary rachis (no. 5 excepted) slightly, if at all, aculeate above the base; secondary rachis smooth or merely muricate.

Costae and costules (of the fertile pinnae, at least) devoid of spreading septate hairs beneath, but together with the veins minutely and persistently strigillose----------**2. A. strigillosa.**

Costae and costules hirsutulous to long-hirsute beneath with pale septate hairs, other pubescence present or lacking.

Pinnules, all or several, distinctly stalked.

Segments 20 to 30 pairs, oblique, linear to linear-oblong, acute, serrate; pinnules attenuate to caudate, mostly stalked----**3. A. myosuroides.**

Segments about 15 pairs, spreading, oblong, obtuse or muticous, coarsely dentate; pinnules acute, only the lower ones stalked.

4. A. notabilis.

Pinnules sessile.

Primary rachis apparently glabrous, the few or minute hairs easily abraded, perfectly deciduous.

Spines present on the primary rachis, acicular, up to 4 mm. long; pinnules 25 to 30 pairs; segments about 25 pairs, long-hirsute beneath upon the costule and the base of the veins----**5. A. pansamalana.**

Spines absent, the primary rachis distantly muricate only; pinnules about 40 pairs; segments about 30 pairs, hirtellous beneath along the costule and the veins throughout----------**6. A. stipularis.**

Primary rachis at first densely pubescent or hirsute with close-set septate hairs, at length invariably scabrous from their persistent inflated bases.

Fertile segments truly pinnatifid; primary and secondary rachises with occasional large flat persistent white scales------**7. A. mexicana.**

Fertile segments crenate-serrate or crenate-dentate to serrately incised; rachises devoid of large white scales.

Segments serrately incised.

Pinnules 20 to 25 pairs, 7 to 11 cm. long; segments 18 to 20 pairs, narrowly oblong----------**8. A. acutidens.**

Pinnules 30 to 35 pairs, 10 to 15 cm. long; segments 25 to 30 pairs, linear ----------**9. A. scabriuscula.**

Segments crenate-serrate or crenate-dentate.

Costules and veins merely hirsute beneath, a strigillose undercovering wanting; paraphyses dark red, turgid, persistent.

10. A. nesiotica.

Costules and veins densely strigillose beneath, also hirsute (except the veins of *A. bicrenata*); paraphyses hyaline, flaccid. mostly deciduous.

Segments copiously hispid above upon the costule, veins, and leaf tissue, nearly devoid of bullate scales beneath.
11. A. trichiata.

Segments glabrous above, or with a few spinous hairs along the costule, bearing numerous small white or pale yellow roundish scales beneath near the base of the veins.

Costules hirsute beneath, the veins devoid of long hairs; segments glabrous above_____**12. A. bicrenata.**

Costules and veins hirsute beneath; segments with a few spinous hairs above, these usually confined to the costule.
13. A. swartziana.

1. Alsophila microdonta Desv. Mém. Soc. Linn. Paris **6**: 319. 1827.

Polypodium microdonton Desv. Ges. Naturf. Freund. Berlin Mag. **5**: 319. 1811.

Polypodium aculeatum Raddi, Opusc. Sci. Bologna **3**: 288. 1819; Pl. Bras. **1**: 27. *pl. 42.* 1825. Not *P. aculeatum* L. 1753.

Alsophila armata Mart. Icon. Pl. Crypt. 72. *pl. 28, 48.* 1834. Not *A. armata* (Swartz) Presl, 1836.

Alsophila ferox Presl, Tent. Pter. 62. 1836.

Caudex erect, 1 to 5 meters high, slender, only a few cm. thick; fronds few, arcuate-spreading, 2 to 2.5 meters long; stipes up to 1 meter long, light brown, lustrous, glabrate, freely aculeate, the spines mostly distant, narrowly conical, curved, up to 1 cm. long; blades ovate-oblong, abruptly acuminate, up to 1.5 meters long and 1.2 meters broad, subtripinnate, the primary rachis brown or yellowish brown, armed with distant long pungent spines throughout; pinnae petiolate, narrowly oblong, acuminate, 30 to 60 cm. long, 10 to 25 cm. broad, the secondary rachis densely yellowish-strigose above, thinly and deciduously scurfy-hirtellous beneath and distantly aculeate, the spines subacicular, spreading or retrorse, up to 4 mm. long, dull stramineous; pinnules about 20 pairs, nearly horizontal, sessile or subsessile, linear-oblong or oblong-lanceolate, long-attenuate, 5 to 13 cm. long, 1.5 to 3 cm. broad, the costa densely yellowish-strigose above, beneath thinly scurfy-hirtellous and bearing a few very minute tawny bullate scales, these mostly caducous; segments about 23 pairs, membrano-herbaceous, linear, acutish, 8 to 18 mm. long, 2 to 4 (5) mm. broad, falcate, crenate-serrate or (beyond the middle) obliquely incised, the teeth or lobes obscurely dentate; costules distantly hispid above, thinly scurfy-hirtellous beneath; veins oblique, mostly once or twice forked, or in the large sterile parts pinnately branched, glabrate above, beneath deciduously mealy-puberulous; sori 6 to 11 pairs, small, adjacent; receptacle minute; paraphyses very numerous, pale, flaccid, moniliform, equaling the sporangia, persistent.

The present species, the type of which is doubtfully South American, occurs over a wide area on the continent, namely from Veracruz and Tabasco to Brazil and eastern Peru, mainly at low elevations near the coast, but is definitely known in the West Indies only from the Isle of Pines, Cuba. From the other species treated in the present paper it is at once distinguished by its closely scurfy-hirtellous or mealy-puberulous costae, costules, and veins beneath, and by its having both the primary and secondary rachis armed with slender, more or less retrorse, long, pungent spines. The name *Alsophila ferox* Presl, under which this species has commonly gone, is given as a transfer of *Cyathea ferox* Presl, often quoted as published in the Deliciae Pragenses (1822), but no such description occurs in that work. *Alsophila ferox* Presl

(1836) is properly published, however, by citation of synonyms.

The following specimens are in the National Herbarium:

CUBA: Isle of Pines, *Britton, Wilson & Selby* 14329.

VERACRUZ: Chinameca, *Orcutt* 3194 (three sheets). Coatzacoalcos, Isthmus of Tehuantepec, *C. L. Smith* 2095, as *A. armata* Presl.

TABASCO: Near Atasta, *Rovirosa* 48.

GUATEMALA: Puerto Barrios, border of swamp, *Maxon & Hay* 3058 (four sheets).

HONDURAS: San Pedro Sula, Dept. Santa Bárbara, alt. 180 meters, *Thieme* (J. D. Smith, no. 5638 in part), as *A. ferox* Presl.

COSTA RICA: Bords d'un ruisseau à Buenos Aires, *Pittier* 4847 in part, as *A. aculeata* J. Sm. Bords du Río General à Palmares, valée du Diquís, alt. 500 meters, *Pittier* 12160, as *A. ferox* Presl. Without locality, *Werckle* (ex herb. Christ, as *A. ichtyolepis* Christ).

PANAMA: Without special locality, 1860, *Hayes* 2.

TRINIDAD: Without locality, *Fendler* 60, as *A. ferox* Presl; ex herb. Bot. Gard. Trinidad, 146, as *A. armata* Presl.

BRAZIL: Rio de Janeiro, 1851, *Anderson; Dusén* 1938. Near Pará, March, 1908, *Hernández.* Without locality, *Wilkes Exped.*

PERU: Near Tarapoto, *Spruce* 4726.

Of the two sheets of *Pittier* 4847 in the National Herbarium, one belongs to *A. trichiata* and one to *A. microdonta.* The mixed number perhaps explains Christ's citation of 4847 as *A. ferox,* following his description of *A. ichtyolepis.*

The Honduras material distributed by Captain Smith as no. 5638 is partly *A. microdonta* and partly *A. myosuroides* Liebm.

2. Alsophila strigillosa Maxon, sp. nov. PLATE 11.

Caudex about 2.5 meters high; fronds several, spreading, 2.5 to 3.3 meters long; stipe 60 to 90 cm. long, freely armed on the lower side with narrowly conical pungent spines up to 4 mm. long, densely paleaceous on the inner side, the scales lance-attenuate to oblong-ovate, 1.5 to 2.5 cm. long, dirty white, thin but firm, erose; blade ovate, short-acuminate, subtripinnate, 2.4 to 2.7 meters long, about 1 meter broad, the primary rachis laxly yellowish-hirsute, aculeolate; pinnae about 20 pairs, sessile, the basal ones oblong-ovate, about 30 cm. long, the middle ones narrowly oblong, acuminate, about 50 cm. long, 18 cm. broad, the secondary rachis yellowish, thinly hirsute-strigose above, distantly muricate beneath and nearly glabrous; pinnules 23 to 28 pairs, approximate, spreading, sessile, linear-oblong, attenuate in the outer third, 7 to 10 cm. long, 1 to 1.5 cm. broad, subpinnatisect, the costa thinly hirsute-strigose above, minutely strigillose beneath and, in sterile specimens, very scantily hirsute; segments delicately herbaceous, about 22 pairs, close, narrowly oblong, subfalcate, rounded at the apex or distally acutish, biserrate, the costule bearing two to four stiff curved yellowish septate hairs above, beneath delicately strigillose (in sterile specimens sparsely hirsute also) and bearing several small whitish hair-tipped bullate scales; veins 9 to 11 pairs, mostly once forked below the middle, glabrous above, delicately strigillose beneath; sori 5 to 9 pairs, small, contiguous; receptacles capitate, laxly and scantily pilose.

Type in the herbarium of Yale University, Daniel C. Eaton Collection, consisting of four sheets said to have been collected at Nima-nima, eastern Cuba, December 3, 1859, by Charles Wright (no. 1062); distributed as *Alsophila aspera* and listed under this name by Eaton. A specimen of *Wright* 1062 in the Sauvalle Herbarium at Havana is identical, and there is in the Eaton Collection an additional Wright specimen without number ("Monte Verde; May; road to Palenque") which is apparently the same.

Underwood, recognizing the species as new, drew up a brief description based on three specimens of *Wright* 1062 at Kew (these without definite locality data), and referred to two sterile specimens of *Wright* 1062 in the Eaton Herbarium, the latter said to be from "Monte Verde, road to Palenque." He had apparently confused the data in his notes, for only the unnumbered Palenque specimen mentioned above is now to be found at Yale, this bearing his annotation, "The plant is represented at Kew by three sheets numbered 1062." There is no indication that the four Nima-nima sheets (two fertile and two sterile) were ever seen by him. Inasmuch also as the species name selected by Underwood has been used in Cyathea (now merged by Copeland and others with Alsophila), it seems best to assign a new name and describe the species on the basis of the excellent speciemns first cited above.[1]

Alophila strigillosa is well marked by the characters given in the key. In fertile specimens, whether young or old, the costae and costules are nearly devoid of long hairs beneath, showing only the closely appressed covering of minute, almost glandlike hairs which have suggested the specific name; but in sterile specimens the characteristic long, septate hairs of the group are distinctly noticeable, though never very abundant.

EXPLANATION OF PLATE 11.—*Alsophila strigillosa.* Section of a pinna of the type specimen. Natural size.

3. **Alsophila myosuroides** Liebm. Dansk. Vid. Selsk. Skrivt. V. **1**: 236. 1849.
Alsophila wrightii Underw.; Maxon, Contr. U. S. Nat. Herb. **23**: 45. 1920, as synonym.

Caudex 2 to 5 meters high, about 10 cm. thick, aculeate at the summit; fronds several, spreading, 1.5 to 2.5 meters long; stipes 0.5 to 1 meter long, light brown, strongly paleaceous at the upper side of the darker arcuate base (the scales subpersistent, linear-attenuate, 2 to 3 cm. long, bright brown, glossy), everywhere minutely aculeate, muricate upward; blades ovate, abruptly acuminate, 1 to 2 meters long, up to 130 cm. broad, subtripinnate, the primary rachis light brown, muricate (aculeolate toward the base), thinly short-strigose, glabrescent; pinnae alternate, spreading, petiolate (up to 4 cm.), narrowly oblong, long-acuminate, 40 to 65 cm. long, 15 to 22 cm. broad, the secondary rachis tawny-strigose above, beneath light olivaceous, laxly short-hirtellous, glabrescent; pinnules 25 to 30 pairs, horizontal or spreading obliquely, mostly stalked (1 to 5 mm.), contiguous or slightly apart, linear-attenuate or oblong-linear and abruptly long-caudate, 8 to 12 cm. long, 1 to 2 cm. broad, the costa strigose above, hirtellous beneath and bearing a few subpersistent, flattish, long-ciliate, bright brown scales 1 mm. long or more; segments dull green, rigidly herbaceous, about 25 pairs, lightly joined at the base, linear, falcate, acutish, 7 to 12 mm. long, 1.5 to 3 mm. broad, the margins deeply crenate-serrate, often revolute, the costules glabrous above, pale-hirtellous beneath and bearing an occasional minute scale; veins oblique, mostly once-forked below the middle, glabrous above, slightly glandular-strigillose beneath; sori 7 to 10 pairs, slightly inframedial, the very numerous sporangia confluent; paraphyses numerous, flaccid, persistent.

Described by Liebmann upon material collected by himself in dense, wet forests in the subtropical region of Chinantla, Oaxaca, at an elevation of 600 to 1,200 meters, a specimen in the National Herbarium (received from Copenhagen) being marked as collected between Lacoba and Teotalcingo. This

[1] Besides the material mentioned there is a sheet of *Wright* 891 in the Eaton Herbarium, said to have been collected in eastern Cuba, 1856–57, which contains a pinna of *Cyathea arborea* and one of *Alsophila strigillosa.*

agrees well with the specimens cited below, these indicating a species of average variability considering the rather wide range, which includes the Isle of Pines and a large part of Pinar del Rio, Cuba, and, on the continent, the region from Vera Cruz to Chiapas, southward to British Honduras, eastern Guatemala, and Honduras. The species is usually found at an elevation of less than 200 meters. It is readily separated by the key characters.

The following specimens are in the National Herbarium:

OAXACA: Between Lacoba and Teotalcingo, alt. 600 to 900 meters, *Liebmann* (part of type).

VERACRUZ: Minatitlan, *J. G. Smith* 80. Chinameca, *Orcutt* 3195 (three sheets). Santa Lucrecia, Isthmus of Tehuantepec, *C. L. Smith* 2094, as *A. ferox*. Coatzacoalcos, Isthmus of Tehuantepec, *C. L. Smith* 2093, as *A. pruinata*. Jáltipan, *Goldman* 724.

CHIAPAS: Santo Domingo de Palenque, *C. & E. Seler* 5375 (436), as *A. ferox*.

BRITISH HONDURAS: Without locality, *ex herb. Jenman* (indicated by Jenman as a new species).

GUATEMALA: Los Amates, Dept. Izabal, *Kellerman* 5083.

HONDURAS: Río Permejo, Dept. Santa Bárbara, alt. 180 meters, *Thieme* (J. D. Smith, no. 5637), as *Cyathea arborea*. San Pedro Sula, Dept. Santa Bárbara alt. 180 meters, *Thieme* (J. D. Smith, no. 5638 in part), as *A. ferox*. Trail from Point Triunfo to Eliott's plantation, *Wilson*, 434.

CUBA: Various localities in Pinar del Río Province, *Shafer* 11942, 12005; *Shafer & Léon* 13618; *Wilson* 9226; *Britton, Britton & Cowell* 9635, 9816; *Baker & Dimmock* 4849; *van Hermann* 724; *Britton, Britton & Gager* 7281; *Britton, Earle & Gager* 6750; *Britton, Britton, Earle & Gager* 6640; *Wright* 3969; *Palmer & Riley* 14, 136, 189, 198, 288, 644. Isle of Pines, *Palmer & Riley* 1038; *Curtiss* 346; *Britton, Britton & Wilson* 14790.

4. Alsophila notabilis Maxon, sp. nov. PLATE 12.

Arborescent; stipe not preserved; blade apparently small, about 75 cm. broad, subtripinnate, the primary rachis unarmed, brownish above, dull stramineous beneath, densely strigillose-hispidulous, at length glabrescent, scabrous from the persistent bases of the minute septate hairs; pinnae narrowly elliptic-oblong, short-acuminate, 35 to 40 cm. long, 9 to 11 cm. broad, slightly narrowed at the base, short-petiolate (about 1 cm.), the secondary rachis densely strigose-hispidulous above, beneath short-hirsute with stiff septate hairs, at length scabrous from their persistent inflated bases; pinnules about 25 pairs, approximate, spreading, articulate, sessile or the lower ones short-stalked (1 to 2 mm.), exactly linear-oblong, acute, 4.5 to 5.5 cm. long, 12 to 14 mm. broad, the costa clothed on both sides like the secondary rachis and bearing an occasional flat yellowish brown scale beneath at the base of the costules; segments herbaceous, about 15 pairs, lightly joined at the base, oblong, obtuse or muticous, nearly straight, coarsely and deeply dentate (the teeth subentire), glabrous above except for a few short oblique deciduous hairs upon the costule, very sparsely short-hirsute beneath upon the costule, elsewhere glabrous; veins 5 or 6 pairs, glabrous, mostly once forked about halfway to the margin, the sorus seated at the fork or below; sori 4 to 6 pairs, slightly inframedial, apart from the costule; receptacle small, low, rotund, the sporangia considerably exceeded by the numerous paraphyses, these lax, flattish, with broad thin-walled cells, tapering from near the base (here 2 to 5 cells broad), persistent.

Type in the U. S. National Herbarium, no. 579823, collected at Wafer Bay, Cocos Island, Costa Rica, June 16, 1898, by H. Pittier (no. 12355); distributed

as *Hemitelia platylepis* Hook. Besides a second sheet of the type collection there is a specimen from the same locality collected in January, 1902, by Mr. Pittier (no. 16228).

A very strongly marked species, perhaps not strictly of the group under consideration. The character afforded by the broad attenuate paraphyses is especially noteworthy.

EXPLANATION OF PLATE 12.—*Alsophila notabilis.* Section of a pinna of the type specimen. Natural size.

5. Alsophila pansamalana Maxon, sp. nov.

Arborescent, the caudex presumably several meters high; fronds ample, the blade more than a meter broad, subtripinnate, the primary rachis stout (up to 1.5 cm. thick), buff or pale yellowish brown, glabrate, lustrous, armed with numerous nearly straight, acicular spines up to 4 mm. long; pinnae spreading (or the lower ones somewhat deflexed), narrowly oblong to ovate-oblong, abruptly short-acuminate, 50 to 70 cm. long, 20 to 25 cm. broad, the secondary rachis strigose above, thinly hirsute with pale septate hairs beneath, scabrous from their persistent bases; pinnules 25 to 30 pairs, approximate, spreading, sessile, linear to linear-oblong, long-acuminate, or attenuate in their outer third, 10 to 13 cm. long, 1.5 to 2.5 cm. broad, the costa thinly hirsute-strigose above, yellowish-hirsute beneath with long spreading septate hairs and delicately strigillose; segments herbaceous, about 25 pairs, linear to linear-oblong, acutish, 8 to 14 mm. long, 3 to 4 (5) mm. broad, falcate, inciso-serrate or (in sterile specimens) barely pinnatifid, the lobes serrulate if sterile, with 2 or 3 pairs of oblique pinnately arranged veinlets, usually bidentate if fertile, with a single pair of veinlets; segments glabrescent above, the costule and veins persistently strigillose beneath, the costule also freely yellowish-hirsute; segments bearing 1 to several pairs of minute roundish-ovate, bullate, yellowish scales toward the base; sori small, less than 1 mm. from the costule, the receptacle capitate, sparsely septate-pilose.

Type in the U. S. National Herbarium, no. 830495, collected near Pansamalá, Alta Verapaz, Guatemala, altitude about 1,150 meters, September, 1886, by H. von Türckheim (J. D. Smith, no. 1008); two additional specimens of the same number are at hand. Represented also by two collections from Cobán, Alta Verapaz, altitude 1,350 meters, both by von Türckheim, the first long ago distributed by C. Keck as no. 257, the second one distributed by von Türckheim as no. II. 2088. All the specimens were sent out as *A. armata*.

This species was indicated in manuscript by Underwood as doubtfully new, but under an inappropriate specific name. From *A. scabriuscula*, its closest relative, it is readily distinguished by its freely armed, *glabrous* primary rachis. Even with its hairy covering abraded as completely as possible, the primary rachis of *A. scabriuscula* is still noticeably rough from the persistent inflated bases of the close-set hairs.

6. Alsophila stipularis Christ, Bull. Herb. Boiss. II. 4: 958. 1904. PLATE 13.

Alsophila ichtyolepis Christ, Bull. Herb. Boiss. II. 6: 186. 1906, in greater part.

Arborescent, the caudex 3 to 12 meters high, stout, with conspicuous large elliptical scars; fronds spreading, 3 to 3.5 meters long; stipe yellowish brown, up to 80 cm. long, 2 to 3 cm. thick, glabrous, deciduously paleaceous (the scales 3 to 5 cm. long, lance-attenuate with filiform tips, firm, dark brown, lustrous, with narrow whitish friable borders), distantly aculeolate, the spines less than 1 mm. long; blades ovate, abruptly acuminate, 2 to 3 meters long, up to 1.5 meters broad, subtripinnate, the primary rachis yellowish brown, distantly muricate toward the base, glabrous or nearly so, bearing large, oval, chitinous,

yellowish brown, scattering, caducous scales; pinnae numerous, sessile, the basal and lower ones opposite, strongly retrorse, about 60 cm. long, the middle ones opposite or nearly so, less retrorse, up to 80 cm. long and 30 cm. broad, oblong, acuminate, the stout secondary rachis yellowish brown, densely crispate-strigose above, beneath distantly muricate and at first retrorsely hirtellous, soon glabrate; pinnules about 40 pairs, sessile, horizontal, the basal ones (one or both) greatly reduced and overlying the primary rachis, the middle ones 10 to 15 cm. long, 1.3 to 3 cm. broad, linear-oblong to oblong-lanceolate, long-attenuate, the stout elevated costa strigose-hirsute above, beneath densely hirtellous; segments carnose-herbaceous (often discoloring), subglaucous beneath, about 30 pairs below the deeply serrate apex, linear, acutish, 7 to 16 mm. long, 1.5 to 2.5 mm. broad, falcate, deeply crenate-serrate (the teeth lightly serrate), joined at the slightly broader base, usually with a few short weak deciduous hairs above (along the costule and veins), hirtellous beneath upon the costule and veins and obscurely ciliate, a few deciduous yellowish or pale brown scales borne also upon the costule and the lower part of the veins; veins 12 to 16 pairs, once forked near the middle, or with 3 subequal branches; sori small, close, 10 to 14 pairs; receptacle capitate; paraphyses of curved inflated septate hairs, surpassing the sporangia.

Described originally from material collected in Costa Rica by Werckle, the precise locality and date not stated. Subsequently this species was collected in some quantity in Costa Rica and western Panama by the writer. These specimens agree very closely with a good Costa Rican specimen sent to the National Museum by Christ, and with fragments from five separate sheets under this cover in his herbarium, courteously forwarded by Prince Roland Bonaparte, all of these collected by Werckle. There is no doubt as to the identification and distinctness of *A. stipularis*.

Two years later, however, Christ described *A. ichtyolepis* from Costa Rica, citing four collections: *Tonduz* 12527, *Pittier* 9469, *Werckle* 57, and an unnumbered collection made by Werckle at Navarro. These specimens are of two species. The first cited, *Tonduz* 12527, as represented by two excellent sheets in the National Herbarium and by Christ's own specimen (as shown by a portion recently received from Prince Roland Bonaparte), is exactly *A. stipularis*. Agreeing with it also are specimens collected by Werckle, received long ago from Christ as *A. ichtyolepis*. The Pittier specimen (no. 9469) is widely different, however; it is described below as a new species, *A. trichiata*, and is there compared with *A. stipularis*. So far as can be seen it supplied only a single point in the description of *A. ichtyolepis*, which is thus in the main a redescription of *A. stipularis*.

As seen by the writer in Chiriquí and Costa Rica, *A. stipularis* is a stately plant of wet forested ravines and partly cleared slopes. In habit it resembles *A. swartziana*, but lacks much of the grace and beauty of that species.

The following specimens, besides the Werckle plants mentioned, are in the National Herbarium:

COSTA RICA: La Palma, alt. 1,450 to 1,550 meters, pasture land at edge of forest, *Maxon* 459; *Tonduz* 12527. Vicinity of Coliblanco, alt. 1,950 meters, on deforested slope, *Maxon* 302, 313. Region of San José, June, 1908, *Brade* 175.

PANAMA: Humid forest of the upper Caldera watershed, Holcomb's trail, above El Boquete, Chiriquí, alt. 1,650 to 1,925 meters, *Maxon* 5687.

EXPLANATION OF PLATE 13.—*Alsophila stipularis*. Section of a large pinna (*Maxon* 302). Natural size.

7. Alsophila mexicana Mart. Icon. Pl. Crypt. 70. *pl. 45*. 1834.
Alsophila godmani Hook. in Hook. & Baker, Syn. Fil. 36. 1866.

Caudex about 5 meters high; blades probably ovate, 2 meters long or more, at least 125 cm. broad, subtripinnate, the primary rachis yellowish brown, apparently not aculeolate, very densely long-hirsute (at length strongly scabrous from the persistent inflated bases of the hairs) and bearing large, broadly ovate, thin, white, subpersistent, scattering scales, these extending at intervals along the secondary rachises; larger pinnae opposite, petiolate (1 to 3.5 cm.), narrowly oblong, acuminate, 50 to 60 cm. long, 16 to 22 cm. broad, the secondary rachises clothed like the primary, strongly scabrous with age; pinnules contiguous or approximate, horizontal, sessile, about 30 pairs, linear-oblong, abruptly acuminate-attenuate, 8 to 11 cm. long, 1.5 to 2.3 cm. broad, the costa thinly strigose-hirsute above, conspicuously hirsute beneath with long coarse yellowish-white septate hairs, also paleaceous, a few of the scales large, flat, and caducous, the majority minute, ovate, strongly bullate, whitish, subpersistent; segments thin-herbaceous, dull yellowish green (often discoloring), subglaucous beneath, about 9 pairs, rather close, linear, subobtuse, slightly falcate, 8 to 13 mm. long, 2.5 to 4 mm. broad, narrowly short-decurrent, pinnatifid, the ovate-oblong lobes crenate-serrate, mostly with pinnate veins; costules and veins hispid above, beneath sparingly hirsute or hirtellous, the costules also distantly white-paleaceous; sori small, confined to the basal two-thirds of the segment, one or two borne basally upon each lobe; receptacle minute, globose; paraphyses very few, pale, inflated, scarcely exceeding the sporangia.

Founded on specimens collected by Karwinsky at San Pablo de Teoxomulco, Oaxaca, Mexico. A careful perusal of the description and beautifully detailed illustrations leaves no doubt that this is the same as *A. godmani*, later described by Hooker upon Guatemalan material collected by Salvin and Godman, near Cobán. The truly pinnatifid segments and the large white deciduous scales of the main rachises are unique among the species of this group.

The following specimens are in the National Herbarium:

CHIAPAS: Finca Irlanda, September, 1913, *Purpus* 6767 (sterile).

GUATEMALA: Pansamalá, Alta Verapaz, alt. 1,200 meters, *Türckheim* (J. D. Smith, no. 1007), distributed as *A. bicrenata* (three sheets). Near Cobán, alt. 1,550 meters, *Türckheim* II. 1655. Above Trece Aguas, Alta Verapaz, alt. 900 meters, *Cook & Doyle* 23b.

8. Alsophila acutidens Christ, Bull. Herb. Boiss. II. 6: 186. 1906. PLATE 14.

Alsophila leucolepis pubescens Christ in Pittier, Prim. Fl. Costar. 3[1]: 42. 1901

Caudex undescribed; stipe about 2.5 cm. in diameter, yellowish brown, sulcate, closely pubescent, armed with distant straight conical blackish spines about 3 mm. long, paleaceous at the base, the scales large, lustrous, yellowish brown or lighter, with whitish scarious margins; blade probably ovate, at least 115 cm. broad, abruptly short-acuminate, the primary rachis similar to the stipe but aculeate only toward the base, brownish-puberulous, at length minutely scabrous; pinnae elongate-oblong, acuminate, 50 to 60 cm. long, 15 to 20 cm. broad, short-petiolate (1.5 cm.) to sessile, the secondary rachis strigose-hispid above with curved brownish hairs, beneath weakly griseous-hirsute; pinnules 20 to 25 pairs, approximate, sessile, elongate-oblong, acuminate-attenuate, 7 to 11 cm. long, 2 to 2.6 cm. broad, the costa densely hispid-strigose above, beneath short-hirsute with whitish hairs and bearing a few lance-ovate attenuate whitish bullate scales, these scattered but persistent; segments delicately herbaceous. 18 to 20 pairs, approximate, narrowly oblong, obtusish, 10 to 14 mm. long, 3 to 4 mm. broad, mostly separated by narrow acute sinuses (the basal segments sometimes apart), serrately incised, the teeth or lobes muticous, faintly bidentate; costules elevated, weakly strigose above, whitish-

hirtellous beneath and bearing an occasional minute white scale; veins 9 to 11 pairs, spreading, mostly once forked, yellowish-hispid above, laxly hirtellous beneath, the hairs extending to the leaf tissue on both sides; sori 7 to 9 pairs, small, nearly medial; receptacle depressed-globose; paraphyses numerous, flaccid, hyaline, surpassing the sporangia.

Specimens of the following collections, all cited in the original publication, are in the National Herbarium:

COSTA RICA: Cañas Gordas, alt. 1,100 meters, February, 1897, *Pittier* 10981, 10989, 10992.

Most nearly related to *A. scabriuscula*, from which it differs not only in the key characters but also in its puberulous rather than densely hirsute primary rachis, its short-petiolate rather than sessile pinnae, and its laxly hirtellous rather than coarsely hirsute under surfaces, as well as in the shorter, more numerous, and more widely distributed hairs of the upper side of the segments.

EXPLANATION OF PLATE 14.—*Alsophila acutidens*. Section of a pinna of one of the original collections, *Pittier* 10992. Natural size.

9. Alsophila scabriuscula Maxon, Proc. Biol. Soc. Washington **32**: 125. 1919.

This recently described species of Veracruz and eastern Guatemala is compared with *A. mexicana* and *A. bicrenata* at the place of publication. The following specimens have been examined:

GUATEMALA: Near Cubilquitz, Alta Verapaz, alt. 350 meters, *Türckheim* (J. D. Smith, no. 7806), type. Same locality, *Türckheim* II. 1454.

VERACRUZ: Near Córdoba, *Fink* 5. Orizaba, *Müller* 379 (determined by Mettenius as *A. aculeata* Klotzsch).

10. Alsophila nesiotica Maxon, sp. nov.

Caudex 3 to 12 meters high; stipe (incomplete) yellowish brown, sparingly aculeolate (the spines narrowly conical, blunt, about 1 mm. long) and everywhere scabrous from the persistent bases of the close-set spreading yellowish septate hairs; primary rachis similarly scabrous; pinnae sessile, oblong, abruptly short-acuminate, about 40 cm. long, 14 to 17 cm. broad, the secondary rachis copiously strigose-hirsute above, hirsute beneath with long pale septate hairs, scabrous from their persistent bases; pinnules about 25 pairs, slightly apart, spreading, sessile, long-acuminate (the tip attenuate), 7 to 9 cm. long, 1.4 to 1.7 cm. broad, subpinnatisect, the costa laxly strigose above, long-hirsute beneath with septate hairs and bearing occasional flat yellowish scales, these deciduous; segments papyraceo-herbaceous, about 23 pairs, narrowly oblong, acutish, 7 to 9 mm. long, 2 to 3 mm. broad, slightly falcate, serrately incised (the teeth sharply bidentate), bearing two to five spinous hairs along the costule above (otherwise glabrous), beneath sparingly yellowish-hirsute along the costule and veins and between the veins, minute hairs wanting; veins 9 or 10 pairs, oblique, mostly once forked; sori 2 to 6 pairs, slightly inframedial, small; receptacle capitate; paraphyses numerous, turgid, glandlike, vinaceous or darker, shorter than the sporangia.

Type in the U. S. National Herbarium, no. 578487, collected in forest, Wafer Valley, Cocos Island, Costa Rica, altitude 50 meters, January, 1902, by H. Pittier (no. 16229); distributed as *A. bicrenata*. A second sheet of the type collection is at hand, as also a specimen collected on Cocos Island in July, 1899, by Snodgrass and Heller (no. 964), distributed as *A. armata*.

A strongly marked species for this group, at once distinguished by its unique paraphyses.

11. Alsophila trichiata Maxon, sp. nov. PLATE 15.

Caudex erect, 2 meters high or more, about 12 cm. thick toward the base; fronds about 3.5 meters long; stipe rufous-ochraceous, armed with scattering erect conical spines (2 to 4 mm. long), scabrous from the persistent inflated bases of short stiff crowded septate hairs; blades ovate, presumably about 2.5 meters long, about 1.4 meters broad at the base, nearly 2 meters broad at the middle, subtripinnate, the primary rachis invariably scabrous like the stipe, distantly aculeolate at the base, the spines about 1 mm. long; pinnae sessile, spreading (or the basal ones retrorse), narrowly oblong, acuminate, 50 to 90 cm. long, 16 to 26 cm. broad, the secondary rachis light brownish, densely strigose above, beneath long-hirsute (scabrous at length) and distantly muricate; pinnules about 30 pairs, sessile, linear-lanceolate, attenuate-caudate, 8 to 13 cm. long, 1.2 to 1.9 cm. broad, the costa strigose-hispid above, beneath persistently hirsute with very long, delicate, curved or subflexuous, whitish, septate hairs; segments soft-herbaceous, dull green, about 30 pairs below the serrate-serrulate apex, linear to linear-oblong, acutish, 6 to 9 mm. long, 1 to 2 mm. broad, joined at the dilatate base, deeply but finely crenate-dentate (the teeth bidentate), strongly hispid above (the longer hairs confined to the costule and veins), copiously hirsute along the costule and veins beneath (shorter hairs extending along the surface to the widely revolute margins) and bearing a few fugaceous yellowish-brown scales toward the base of the costule; veins 10 to 12 pairs, strongly elevated, once forked near the base; sori 8 to 10 pairs, very small, seated at the fork of the veins, all densely confluent; receptacle small, globose; paraphyses few, lax, septate, scarcely exceeding the sporangia.

Type in the U. S. National Herbarium, no. 579215, collected near Cana, Panama, altitude 660 meters, June 3, 1908, by R. S. Williams (no. 928). This specimen consists of the basal half of a large pinna; the apical half is mounted on sheet no. 1,014,573.

The following additional specimens are in the National Herbarium:

COSTA RICA: Forêts de Tsâki, Talamanca, alt. 200 meters, *Tonduz* 9469 (cited by Christ as *A. ichtyolepis*). Bords d'un ruisseau à Buenos Aires, alt. 300 meters, *Tonduz* 4847 in part.

PANAMA: Bocas del Toro, *Hart* 13 (two sheets). Upper Juan Diaz River region, in deep ravines, *Killip* 2853 (three sheets).

This species is proposed as new only after a very critical study of the material above cited, in comparison with the original descriptions of *A. stipularis* and *A. ichtyolepis*, and type material of these from the herbarium of Prince Roland Bonaparte. Except for *Pittier* 9469, the material originally cited by Christ under *A. ichtyolepis* all pertains to *A. stipularis*, so far as can be ascertained. The description itself of *A. ichtyolepis* applies fully to *A. stipularis* with the exception of the armiture ascribed to the stipe, this single character evidently having been drawn from *Pittier* 9469.

The relationship between *A. trichiata* and *A. stipularis* is not, however, particularly close, *A. trichiata* being well distinguished by its strongly scabrous rachises, conspicuously long-hirsute costae, costules, and veins, and soft-herbaceous segments, these strongly hispid above. In texture, habit, and most other particulars the two species are strongly at variance. *A. trichiata* is also a plant of comparatively low elevations, while *A. stipularis* is confined to the higher mountain regions. From its nearer relatives, *A. bicrenata*, *A. scabriuscula*, and *A. swartziana*, it is readily separable by the characters given in the key. The "stipular" character of dwarfed basal pinnules overlying the main rachis is common to several species of this group.

EXPLANATION OF PLATE 15.—*Alsophila trichiata.* Section of a pinna, type specimen. Natural size.

12. Alsophila bicrenata (Liebm.) Fourn. Mex. Pl. Crypt. 134. 1872.

Cyathea bicrenata Liebm. Dansk. Vid. Selsk. Skrivt. V. 1: 289. 1849.

Caudex erect, 5 to 10 meters high, about 15 cm. thick; fronds 3 to 4 meters long; stipe stout, yellowish brown, muricate from persistent hair-bases, freely aculeate, the spines slenderly conical, pungent, up to 2.5 mm. long; blades ovate, 2 to 3 mm. long, subtripinnate, the primary rachis scabrous like the stipe, apparently not aculeate; pinnae sessile, spreading, oblong-lanceolate, acuminate, 50 to 60 cm. long, 14 to 20 cm. broad, the secondary rachis densely short-strigose above, at length scabrous beneath, the jointed septate hairs spreading or weakly retrorse, often with recurved tips; pinnules about 30 pairs, sessile, spreading or suboblique, linear-lanceolate, attenuate, 8 to 11 cm. long, 1 to 1.5 cm. broad, the costa freely hirsute beneath, the spreading or weakly curved yellowish hairs up to 3 mm. long; segments thin-herbaceous, dull green (often discoloring), about 25 pairs, narrowly oblong from a dilatate base, acutish, falcate, suboblique, 6 to 9 mm. long, 2 to 2.5 mm. broad, the margins revolute, deeply crenate-dentate, the teeth bidentate; costules glabrous above, minutely strigillose beneath, freely long-hirsute like the costa, and bearing numerous small, whitish or brownish-yellow, persistent bullate scales in the basal part; veins about 11 pairs, spreading, mostly once forked just beyond the middle, glabrous above, minutely strigillose beneath (long hairs wanting); sori 6 to 8 pairs, small, slightly inframedial; receptacles small, capitate; paraphyses few, griseous, exceeding the sporangia, deciduous.

Founded by Liebmann upon specimens collected by himself between Trapiche de la Concepcion and Totontepec, Oaxaca, at an altitude of 1,500 to 1,650 meters, and since ascribed a wide range in tropical America. In the key it falls next to *A. swartziana*, and this species and *A. mexicana* are probably its nearest relatives.

The following specimens are in the National Herbarium:

OAXACA: A pinna of the type collection, *Liebmann.*

VERACRUZ: Near Jalapa, alt. 1,200 meters, in wet ravines, *Pringle* 8174; distributed as *A. armata* (three sheets). Huatusco, May 28, 1857, *Mohr.*

Reported by Liebmann from the State of Puebla also.

13. Alsophila swartziana Mart. Icon. Pl. Crypt. 73. *pl. 49.* 1834. PLATE 16.

Polypodium armatum Swartz, Prodr. Veg. Ind. Occ. 134. 1788.

Alsophila armata Presl, Tent. Pter. 62. 1836. Not *A. armata* Mart. 1834.

Caudex erect, 8 to 15 meters high, about 15 cm. thick, copiously pale-chaffy at the apex; fronds 15 to 20, 2 to 3 meters long, spreading from an erect base; stipes very stout, green, succulent, freely armed with spines; blades ovate, short-acuminate, 2 to 2.5 meters long, about 1.2 meters broad, subtripinnate, the primary rachis stout (up to 2 cm. thick), distantly aculeolate (the spines erect, sharply conical, up to 2 mm. long) and densely hirsute with yellowish septate hairs, eventually scabrous; pinnae opposite, sessile, spreading (the lower ones deflexed), lance-oblong, acuminate, 30 to 65 cm. long, 12 to 24 cm. broad, the secondary rachis laxly strigose-hirsute above, beneath hirsute like the primary rachis but invariably unarmed; pinnules about 30 pairs, sessile, spreading, linear-oblong to deltoid-lanceolate, attenuate, 6 to 12 cm. long, 1 to 2.2 cm. broad, the costa laxly strigose above, beneath minutely strigillose and freely long-hirsute; segments delicately herbaceous, dull green above (often discoloring), subglaucous beneath, about 25 pairs, linear from a dilatate base, obtuse (or acutish in drying), falcate, suboblique, 6 to 12 mm. long, 2 to 3 mm. broad, the margins revolute in drying, crenate-serrate, the teeth bidentate;

costules with a few weak spinous hairs above, beneath minutely strigillose, long-hirsute, and bearing a few small persistent white bullate scales in the basal part; veins 9 to 12 pairs, once forked at a wide angle below the middle, glabrous above, beneath minutely strigillose and long-hirsute; sori 8 to 10 pairs, small, inframedial, confluent; receptacles capitate; paraphyses rather few, pale, exceeding the sporangia.

Described from the mountains of Jamaica and nearly confined to that island, there occurring rather commonly at altitudes from 600 to 1,600 meters. The following specimens have been examined:

JAMAICA: Morces Gap, alt. 1,500 meters, *Underwood* 1529. Foot of Catherines Peak, alt. 1,500 meters, *Eggers* 3634. Near Bath, November, 1886, *Sherring*. Trail to New Haven Gap, above Cinchona, *Underwood* 3133. Road from Silver Hill Gap to Hardware Gap, alt. 900 to 1,200 meters, *Maxon & Killip* 1261. Without locality, *Hart*, 97.

CUBA: Monte Verde, May, 1865, *Wright* (without number, D. C. Eaton Herbarium).

This species is usually known as *Alsophila armata* (Swartz) Presl, a name which under the Vienna Code can be maintained. Presl's transfer of Swartz's name is, however, antedated two years by *A. armata* Mart., a new name assigned by Martius (with description and excellent illustration) to the plant with strongly aculeate primary and secondary rachises now known under the earlier name *A. microdonta* Desv. For the Jamaican plant of Swartz (*Polypodium armatum*) Martius proposed the new name *A. swartziana*, which under the so-called American Code must be taken up on the ground that the publication of *A. armata* Mart. 1834 (though this is a pure synonym of *A. microdonta* Desv., 1827) precludes use of the transferred name *A. armata* (Swartz) Presl, 1836.

Among North American species *A. swartziana* is nearest related to *A. bicrenata*, as indicated in the key. It has a close relative also in the Brazilian *A. hirta* Kaulf., which, together with the other South American species of this group, is in need of critical revision.

EXPLANATION OF PLATE 16.—*Alsophila swartziana*. Section of a pinna of medium size (*Underwood* 1529). Natural size.

A SINGULAR NEW ALSOPHILA FROM PANAMA.

Among the plants gathered in Panama by American collectors in recent years is the following remarkable new species of *Alsophila*, subgenus *Trichopteris*. It differs from all the known species of that group in its simply pinnate blades.

Alsophila williamsii Maxon, sp. nov. PLATE 17.

Trunk 2 meters high or more, 6 cm. in diameter; fronds several, spreading, 105 to 115 cm. long; stipe 25 to 35 cm. long, 4 to 7 mm. thick (the extreme basal part not seen), light brown, apparently unarmed, deeply trisulcate above, rounded beneath, deciduously puberulous, persistently paleaceous in the basal half or two-thirds, the scales ovate-oblong to deltoid-lanceolate, attenuate, 8 to 15 mm. long, firm, lustrous, subfalcate, subtortuous, yellowish white, concolorous or often with a broad median stripe of bright brown toward the apex, the margins denticulate, friable; blades oblong, 50 to 85 cm. long, 30 to 40 cm. broad, simply pinnate, the primary rachis similar to the stipe but not paleaceous, flexuous toward the apex; pinnae 15 to 20 pairs, spreading, distant,

alternate (or the lower ones subopposite), conspicuously jointed to the rachis upon slender stalks 7 to 12 mm. long, lance-linear from a nearly equilateral, broadly cuneate base, attenuate to subcaudate, 15 to 20 cm. long, 2.5 to 3.5 cm. broad, undulate or obscurely curvescent-serrate, the costa elevated and sulcate on both sides, glabrous; main veins about 35 pairs, spreading, elevated, mostly with 2 or 3 pairs of very oblique, pinnately arranged branches, the basal branches of adjacent groups commonly connected by a short transverse veinlet (forming semioctagonal costal areoles), all the branches excurrent quite to the distinctly callous margin, free or variously connivent, obscurely and sparingly glandular-strigillose beneath; sori in two irregular rows of groups on either side of the costa, the first row 4 to 5 mm. from the costa (the sori solitary on the basal branches, just above the connecting veinlet), the second row a little beyond the middle, composed of groups of 3 or 4 sori each, the sori invariously solitary upon the branches; receptacles broadly elliptical, very large (1 mm. long or more), pulvinate; paraphyses numerous, deciduous, dark, slender, subclavate. Leaf tissue carnose-coriaceous, discoloring in drying, dark brownish green above, brownish olivaceous beneath, sublustrous on both surfaces.

Type in the U. S. National Herbarium, no. 690117, collected in the mountains above Cana, Panama, at an altitude of about 1,800 meters, April 17 to June 8, 1908, by R. S. Williams (no. 850). Know also from a specimen collected on the east slope of Mount Pirri, Province of Panama, Panama, at an altitude of 1,350 meters, June 12, 1912, by E. A. Goldman (no. 1968).

EXPLANATION OF PLATE 17.—*Alsophila williamsii*. Portion of the type specimen. Natural size.

NOTES ON DICRANOPTERIS.

In determining the ferns out of several collections recently received from Trinidad, British Guiana, Brazil, and the Andean region of South America, several species of *Dicranopteris* which are of more than ordinary interest have been encountered. Notes on these, including the description of a new species from Trinidad, are given below. Also, a few additional species are transferred from *Gleichenia*, which is exclusively an Old World genus, in order that the names may be available for use in other connections. The writer is strongly of the opinion, previously expressed, that *Dicranopteris* itself is an aggregate of two or more valid genera.

Dicranopteris affinis (Mett.) Maxon.

Gleichenia affinis Mett.; Kuhn, Linnaea **36**: 167. 1869.

Founded upon material collected at St. Gavan, Peru, by Lechler (no. 2265), and in its typical form apparently known heretofore only from Peru. The following specimen from Ecuador is at hand: Vicinity of Tablón de Oña, September 27, 1918, *Rose, Pachano & Rose* 23122.

Dicranopteris brittonii Maxon, sp. nov. PLATE 18.

An ascending sparingly branched plant of medium size; rhizome not seen; primary leaf-axis (incomplete) light brown, 3 mm. thick, lustrous, deciduously paleaceous (the scales divaricate, dull castaneous, spinescent-ciliate), apparently bearing only a single pair of primary branches, the included bud dormant, 5 to 10 mm. long, the scales dark castaneous, thick, 2 to 3 mm. long, long-attenuate from a cordate-deltoid base, spinescent-ciliate; primary branches 30 to 40 cm. long, twice pseudodichotomous, the included buds invariably dormant (secondary or tertiary axes thus never developed); first internode of the branches

6 to 9 cm. long, naked, or bearing two or three minute segments at the inner base; second internodes 6 to 10 cm. long, intermittently pectinate, or completely pectinate except at the lower side near the base; pinnae diverging (like the internodes) at an angle of 60° or more, narrowly linear-lanceolate, 22 to 30 cm. long, 3 to 4 cm. broad, acuminate, pectinate, cut nearly to the rachis, the sinuses linear, narrowly acute; rachis of pinnae pruinose and (like all the internodes) persistently paleaceous beneath, the scales mostly spreading, similar to those of the buds but paler, thinner, and more freely spinescent-ciliate; segments 70 to 85 on each side, close, nearly linear, 1.5 to 2 cm. long, 4 mm. broad at the base, 3 mm. broad at the middle, narrowly obtuse, rigidly herbaceous, glabrous above, whitish-papillate beneath; margins entire, narrowly revolute; veins 20 to 26 pairs, elevated beneath, mostly once forked, these and the elevated costa very minutely and sparingly paleaceous, the scales mostly with three or four white flaccid hairlike divisions from a turgid vinaceous base, deciduous; leaf tissue glabrous; sori 3-5-sporangiate, slightly inframedial.

Type in the U. S. National Herbarium, no. 1,056,646, collected on a forested bank, Mount Tocuche, Trinidad, April 3 to 5, 1920, by N. L. Britton, T. E. Hazen, and Walter Mendelsohn (no. 1352). Additional material of this collection is in the Underwood Herbarium, New York Botanical Garden, and there is at hand a single specimen from Trinidad, distributed as no. 74 from the Trinidad Botanical Garden Herbarium.

Dicranopteris brittonii is most nearly allied to *D. palmata* (Schaffn.) Underw. and *D. mellifera* (Christ) Underw., the former a species of Veracruz, Alta Verapaz, Cuba, and Jamaica, the latter restricted to Costa Rica. *D. mellifera* is a much larger plant in every respect, with pinnae up to 6 cm. broad, segments with 25 to 35 pairs of veins, and lower surfaces (costae, veins, and leaf tissue) rather freely clothed with persistent hairlike stellate scales, these lacking the dark thick base seen in *D. brittonii*. *D. palmata* is more nearly related, but this is a plant with shorter, greenish or olivaceous internodes, ferruginous or light castaneous buds, bright green and scarcely revolute segments, immersed veins, and the capillary stellate scales of the under surface persistent and extending to the leaf tissue.

EXPLANATION OF PLATE 18.—*Dicranopteris brittonii*. A specimen of the type collection. One-half natural size.

Dicranopteris gracilis (Mart.) Maxon.

Mertensia gracilis Mart. Icon. Pl. Crypt. 107. *pl. 59. f. II.* 1834.

Gleichenia gracilis Moore, Ind. Fil. 378. 1862.

Founded upon material collected in the mountains of southern Minas Geraes, Brazil. Apparently a little known species. Two sheets of *Regnell* III. 1491, from Minas Geraes, are referred here with doubt.

Dicranopteris longipes (Fée) Maxon.

Mertensia longipes Fée, Crypt. Vasc. Brés. **2**: 87. *pl. 105 f. 2.* 1872–73.

Gleichenia longipes Christ in Schwacke, Pl. Nov. Mineiras **2**: 35. 1900.

Founded upon specimens from the Serra do Pica, Brazil, *Glaziou* 5235. Certainly a close ally of *D. pruinosa*, but lacking the strongly pruinose under surfaces of that. Besides a fragment of the type collection the following specimens are in the National Herbarium:

BRAZIL: Serra do Itatiaya, May 19, 1902, *Dusén* 153; July 26–30, 1915, *Rose & Russell* 21288.

Dicranopteris longipinnata (Hook.) Maxon.

Gleichenia longipinnata Hook. Sp. Fil. **1**: 9. 1844.

Mertensia longipinnata Klotzsch, Linnaea **18**: 537. 1844.

Described from Surinam (*Hostmann* 238). A fragment of the original collection, received from Rosenstock, indicates a strongly marked species allied to *D. mellifera* (Christ) Underw., of Costa Rica. The scales of the segments are stellate, consisting wholly of a few long stiff ferruginous hairlike divisions, and extend rather freely quite to the margins. They are confined to the veins.

Dicranopteris maritima (Hieron.) Maxon.

Gleichenia maritima Hieron. Bot. Jahrb. Engler **34**: 562. 1905.

Founded on two collections from Colombia (*Lechler* 742, 4432). The latter number (from the vicinity of Buenaventura), of which two excellent fruiting specimens are at hand, may be designated as the type.

Dicranopteris nervosa (Kaulf.) Maxon.

Mertensia nervosa Kaulf. Enum. Fil. 37. 1824.

Gleichenia nervosa Spreng. Syst. Veg. **4**: 25. 1827.

An extremely variable species, including, according to Christensen's Index Filicum, *Mertensia beyrichiana* Sturm, *M. cinnamomea* Beyr., *M. latissima* Fée, and *M. neglecta* Sturm. The type is from the island of Santa Catharina, Brazil. In addition to a considerable number of specimens from the States of Paraná, Rio Grande do Sul, Santa Catharina, and Minas Geraes, Brazil, the following specimens are at hand:

BOLIVIA: Near Paraíso, alt. 1,800 meters, February 12, 1902, *Williams* 2904. Cargadera, alt. 2,400 meters, July 29, 1902, *Williams* 1114.

Dicranopteris nuda (Moritz) Maxon.

Mertensia nuda Moritz; Reichardt, Denkschr. Akad. Wiss. Math. Naturw. (Wien) **17**[2]: 28. *pl. 1, f. 1–4*. 1859.

Gleichenia nuda Moore, Ind. Fil. 380. 1862.

Founded upon specimens collected near Tovar, Venezuela, by Moritz (no. 452), a fragment of whose material is at hand. To this species is referred provisionally the following specimen:

COLOMBIA: Santa Marta, 1898–99, *H. H. Smith* 1116.

Dicranopteris pennigera (Mart.) Maxon.

Mertensia pennigera Mart. Icon. Pl. Crypt. 130. *pl. 59. f. I*. 1834.

Gleichenia pennigera Moore, Ind. Fil. 381. 1862.

Described from material collected at several localities in the forested mountain region of the eastern part of Minas Geraes, Brazil, and apparently restricted to that country. *Glaziou* 15786, as represented in the U. S. National Herbarium, is very closely related, if not identical.

Dicranopteris pruinosa (Mart.) Maxon.

Mertensia pruinosa Mart. Icon. Pl. Crypt. 109. 1834.

Mertensia subflabellata Brack. in Wilkes, U. S. Expl. Exped. **16**: 294. 1854.

Gleichenia pruinosa Mett. Ann. Mus. Bot. Lugd. Bat. **1**: 49. 1863.

Founded upon specimens collected in the Province of Minas Geraes, Brazil, by Martius, an authentic portion of whose material is at hand. The relationship of this species would appear to be with the andine **Dicranopteris revoluta** (*Gleichenia revoluta* H. B. K.), to which species Fée reduced it. The following specimens, several of them originally determined as *G. longipes* Fée, are in the National Herbarium:

BRAZIL: Near Rio Janeiro, *Wilkes Exped.* (type of *G. subflabellata*). Minas Geraes, June 23, 1857, *Regnell* II. 326¼ (two sheets). Minas Geraes, June 18, 1861, *Regnell* II. 326¼. Santa Catharina, 1906, *Spannagel* (Rosenstock, no. 239; two sheets). Vitta Nova, Paraná, November, 1906, *Annies*. Vicinity of Itatiaya, alt. 2,000 to 2,300 meters, July, 1915, *Rose & Russell* 21290.

Dicranopteris remota (Kaulf.) Maxon.

Mertensia remota Kaulf. Enum. Fil. 39. 1824.

Gleichenia remota Spreng. Syst. Veg. **4**: 27. 1827.

Described from material collected on the island of St. Catherine, Brazil, by Chamisso. Aside from a fragmentary specimen from Ocaña, Colombia (*Schlim* 226), this species is represented in the National Herbarium by three recent collections from British Guiana: Vicinity of Potaro Landing, *Hitchcock* 17390; *Gleason* 263, 478.

Dicranopteris rubiginosa (Mett.) Maxon.

Gleichenia rubiginosa Mett. Ann. Sci. Nat. V. Bot. **2**: 267. 1864.

Founded on specimens collected at Puente Nacional, Colombia, altitude 1,600 meters, by Lindig (no. 71). Agreeing very closely with the type collection, as represented by a fragment received from Rosenstock, are two specimens collected near Medellin, Colombia, in 1911 by Father Charetier (nos. 41, 6 in part.) Fendler's no. 40, from Tovar, Venezuela, is apparently a luxuriant form of the same species, the pinnae measuring up to 30 cm. long and 3 to 4 cm. broad.

Dicranopteris simplex (Desv.) Maxon.

Mertensia simplex Desv. Mém. Soc. Linn. Paris **6**: 200. 1827.

Gleichenia simplex Hook. Icon. Pl. **1**: *pl. 92*. 1837.

This species, described from Peru and remarkable for being the only species of the genus with simple fronds, is represented in the National Herbarium by the following specimens:

PERU: Mountains east of Balsas, alt. 3,000 meters, May 22, 1912, *Osgood* 69.

ECUADOR: Near Cañar, September 16, 1918, *Rose & Rose* 22772, 23970, 23971. Vicinity of Tablón de Oña, September 27, 1918, *Rose, Pachano & Rose* 23099.

COLOMBIA: Locality data confused, *Stübel*.

Dicranopteris velata (Kunze) Maxon.

Mertensia velata Kunze, Linnaea **9**: 15. 1834.

Gleichenia velata Mett. Fil. Hort. Lips. 113. 1856.

Founded upon Peruvian specimens collected at Pampayaco in July, 1829, by Poeppig. Agreeing closely with the original description and with a fragmentary specimen of the type collection are the following:

COLOMBIA: Santa Marta, 1898–99, *H. H. Smith* 2590.

BRITISH GUIANA: Mount Roraima, December 21, 1884, *Im Thurn* 343.

Dicranopteris yungensis (Rosenst.) Maxon.

Gleichenia yungensis Rosenst. Repert. Nov. Sp. Fedde **5**: 228. 1908.

Founded upon large sterile specimens collected near Unduavi, northern Yungas, Bolivia, altitude 3,300 meters, February 12, 1907, by O. Buchtien (no. 902). A small specimen of the type collection is at hand. This species is hardly a member of the *bifida* group, as stated by Rosenstock, but is more nearly related to *D. rubiginosa*, *D. longipinnata*, *D. brittonii*, and allies, in which a tomentum is never formed upon the under surface of the segments. The following additional specimen, which in minute characters agrees closely with the type collection, is in the National Herbarium:

PERU: Machu Picchu, alt. 2,100 meters, May 22, 1915, *Cook & Gilbert* 865.

THE JAMAICAN SPECIES OF CHEILANTHES.

Jenman, in his synoptical treatment of the ferns and fern allies of Jamaica, recognizes eight species of *Cheilanthes*, as follows:

C. radiata, *C. paupercula*, *C. pedata*, *C. reesii*, *C. micromera*, *C. microphylla*, *C. marginata*, and *C. tomentosa*. Of these the first four pertain to the genus *Adiantopsis* and are so listed by Christensen in the Index Filicum. The remaining four species belong to *Cheilanthes*, as the genus is still defined, but two prove to be undescribed. Descriptions of these and a key to the four Jamaican species are given herewith.

Blades broadly deltoid-ovate, subpentagonal, devoid of hairs and scales.
1. C. harrisii.
Blades of an elongate type, at least the rachises hairy or scaly.
Segments clothed on both surfaces with long tortuous spreading hairs.
2. C. jamaicensis.
Segments bearing minute scattered white turgid few-celled hairs.
Fronds ascending, the primary rachis slender, wiry, flexuous; blades deltoid-lanceolate, subtripinnate; indusia interrupted; leaf tissue membrano-herbaceous——**3. C. microphylla.**
Fronds rigidly erect, the primary rachis stout, straight; blades oblong-lanceolate, bipinnate; indusia continuous; leaf tissue subcoriaceous.
4. C. micromera.

1. Cheilanthes harrisii Maxon, sp. nov.

Rhizome stout, erect or ascending, multicipital, the divisions close, elongate, 2 to 3 cm. thick (including the numerous imbricate stipe bases), copiously wiry-radicose; scales densely appressed-imbricate, 3 to 4 cm. long, acicular, dark castaneous, rigid, strongly sclerotic, opaque, subdenticulate. Fronds several or many, erect, 20 to 38 cm. long; stipe 13 to 25 cm. long, stout (1 to 1.5 mm. thick), lightly flexuous, castaneous, sublustrous, naked, glabrous; blades broadly deltoid-ovate, subpentagonal, 8 to 15 cm. long, 7 to 12 cm. broad, tripinnate-pinnatifid, the rachises firm, castaneous; pinnae slightly oblique, the large basal ones strongly inequilateral, up to 7 cm. long and 4 cm. broad, with about 10 pairs of contiguous pinnules, the inferior basal ones deltoid-ovate, pinnate-pinnatifid; segments mostly fertile, oblique, subdistant, mostly simple, 3 to 5 mm. long, narrowly elliptical, their cuneate base as broad as the greenish-marginate ultimate rachises; sori small, intramarginal, laterally confluent, partially concealed by the reflexed indusiiform margins, these yellowish brown, firm, modified but scarcely forming a proper indusium, undulate, subentire, continuous or interrupted, the smallest (monosorous) segments with the whole tip recurved. Leaf tissue elastico-coriaceous, dull green, minutely whitish-glandulose beneath.

Type in the U. S. National Herbarium, no. 1,010.751, collected "on rocky slopes, near the falls," Old England, below Cinchona, Jamaica, altitude 1,050 meters, February 28, 1919, by William Harris (no. 12902). Other specimens from the same locality are: *Harris* 12891, and, presumably, *Hart* 137, the latter marked as from "4,000 ft., on rocky banks."

Cheilanthes harrisii was described by Jenman as *C. marginata* H. B. K., but it is readily distinguished from that species by its elastico-coriaceous texture, by the complete absence of expanded, delicately membranous wings upon the rachises, and by its firm, entire indusiiform margins, *C. marginata* having ample proper indusia, which are white, truly membranous, and conspicuously fimbriate-glandular.

2. Cheilanthes jamaicensis Maxon, sp. nov.

Rhizome short-creeping or decumbent, nodose, the divisions close, 1 to 2 cm. long, about 1 cm. in diameter, densely paleaceous: scales tufted, 3 to 4.5 mm.

long, about 0.5 mm. broad at the base, thence long-attenuate to the filiform tip, mostly falcate, lightly flexuous, tawny, mostly with a prominent, dark brown, glossy, sclerotic median stripe, or almost wholly sclerotic and opaque. Fronds several, close, laxly ascending, 10 to 35 cm. long; stipes slender, 5 to 20 cm. long, flexuous, purplish brown, sublustrous, copiously imbricate-paleaceous, the scales small, acicular, griseous, appressed or rigidly ascending; blades oblong-lanceolate to narrowly deltoid-ovate, long-acuminate, 5 to 15 cm. long, 2 to 5 cm. broad, tripinnate, the primary rachis clothed like the stipe; large pinnae about 10 pairs, spreading, approximate or (especially the several lower pairs) distant, mostly deltoid-oblong, acutish, the rachis clothed beneath with lax, ascending, acicular, tawny scales; tertiary segments 3 to 6 pairs, distant, spreading, minute, simple and obovate to oval from a narrowly cuneate base, or the larger ones ternately or (rarely) pinnately divided; segments (both surfaces) and minor rachises clothed with long, spreading, recurved, tortuous, glistening, yellowish, septate hairs, these stiff and coarse, more numerous beneath but only slightly entangled; margins of segments recurved, gradually modified to a thin, fragile, rather broad, whitish, indusiiform border nearly throughout, the numerous sporangia exposed at maturity. Leaf tissue delicately herbaceous, dull light green.

Type in the U. S. National Herbarium, no. 1,010,750, collected on rock ledges below Cinchona, Jamaica, February 28, 1919, by William Harris (no. 12905).

Other material at hand is as follows:

JAMAICA: Old England, alt. 1,050 meters, *Harris* 12892. Without locality, *Hart* 78, 271; ex herb. Bot. Dept. Jamaica, "*J. P.* 260."

This is apparently one of the rarer Jamaican ferns, though reported by Jenman[2] (as *C. tomentosa*) as locally abundant in the vicinity of Cinchona, at 1,500 meters altitude, "growing in spreading tufts on the surface and in the crevices of rocks which are well exposed."

Though obviously related to *C. tomentosa*, *C. jamaicensis* differs widely from that in its lax habit, in the complete absence of the long tawny hairs which thickly clothe the stipes and rachises of *C. tomentosa*, in having the leaf margins modified gradually to a thinnish indusiiform border (not abruptly constricted to a membranous proper indusium), and in the scarcely tomentose covering of the under surface of the segments. In most characters, save those of indusium structure, it is even less closely related to *C. catoni*. The characteristics of these two species and their ranges have recently been stated elsewhere.[3]

3. Cheilanthes microphylla Swartz, Syn. Fil. 127. 1806.

Adiantum microphyllum Swartz, Prodr. Veg. Ind. Occ. 135. 1788.

Jamaica is the type locality for *C. microphylla*, which is abundant on rocky banks all over the island, from sea level up to 1,500 meters. This species is found nearly throughout the West Indies, and on the continent extends from the southern United States to Honduras and perhaps southward. The South American material commonly so referred is partly *C. moritziana* Kunze. Another related species is *C. aemula* Maxon, of eastern Mexico.

4. Cheilanthes micromera Link, Hort. Berol. **2**: 36. 1833.

Described from cultivated specimens, and since found to have a rather wide range in Mexico and to occur also in Hispaniola and in Jamaica, where it is of limited distribution near Cinchona, at 1,500 meters elevation (*Underwood* 262, *Hart* 35, *Maxon* 1572). Although sharply distinct from *C. microphylla* in

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[2] Bull. Bot. Dept. Jamaica, no. 38. 6. 1892.

[3] Amer. Fern Journ. **9**: 3, 4. 1919.

the West Indies, juvenile or depauperate Mexican specimens are not always readily distinguished. There are several forms involved in the continental *C. microphylla* complex, which should be worked out critically.

TWO NEW SPECIES OF POLYSTICHUM FROM THE WEST INDIES.

Recent field work and the examination of material in the D. C. Eaton and Gray herbaria have brought to light two new species of *Polystichum* from Cuba and Jamaica, which may be described as follows:

Polystichum deminuens Maxon, sp. nov. PLATE 19.

Rhizome (incomplete) apparently small, ascending, sparingly paleaceous, the scales oblong-ovate, about 4 mm. long, yellowish brown, concolorous, concave, thin; fronds several, laxly ascending, conform, recurved and rooting at the tip, 30 to 42 cm. long; stipes relatively very short, 7 to 8 cm. long, stramineous, bisulcate anteriorly, deciduously paleaceous, the scales laxly ascending, lance-linear, fulvous, 3 to 4 mm. long; blades linear-attenuate, 28 to 34 cm. long, 3 to 3.7 cm. broad in the basal part, ending in a naked proliferous flagellum (3 to 8 cm. long), simply pinnate, the primary rachis similar to the stipe, sparingly paleaceous, the scales linear, tortuous or not; pinnae 17 to 29 pairs, slightly oblique, distant or subdistant, the basal ones broadly subhastate, nearly as broad as long, slightly inequilateral, the basal lobes short, mucronate but not spinescent; characteristic middle pinnae 1.5 to 2.5 cm. long, 7 to 10 mm. broad, short-stalked, oblong or narrowly ovate-oblong, acute, subfalcate from an inequilateral base, subauriculate above, the inner margin parallel to the rachis, the lower one arcuate; upper pinnae gradually reduced, subsessile, ovate-oblong to oval, the uppermost ones minute, obovate, long-decurrent; margins minutely repand-undulate in drying, not spinescent; leaf tissue herbaceous, the veins evident; both surfaces of the pinnae minutely fibrillose-paleaceous; sori 4 to 6 pairs, nearly medial; indusium irregularly erose-denticulate.

Type in the herbarium of Yale University, Daniel C. Eaton Collection, collected near Josephina, eastern Cuba, "in summo monte," November 4, 1859, by Charles Wright (no. 1057).

According to the writer's notes, an identical specimen of this number is in the Gray Herbarium. Since this description was written, also, a less perfect specimen of the same collection has been added to the National Herbarium.

Of the Cuban species of *Polystichum*, *P. deminuens* need be compared only with *P. machaerophyllum* Slosson, a plant which is similarly proliferous, but which differs widely in having the pinnae coriaceous (with obscure venation) and all strongly hastate, with the auricles and apex conspicuously spinescent or aristate.

EXPLANATION OF PLATE 19.—Type specimen of *Polystichum deminuens*, at slightly less than one-half natural size.

Polystichum killipii Maxon, sp. nov. PLATE 20.

Rhizome decurved, 3 to 6 cm. long, 1 to 1.5 cm. thick, woody, densely paleaceous at the tip, the scales linear to deltoid-lanceolate, 6 to 10 mm. long, straight or falcate, subentire, thin, ferruginous, concolorous or with a darker glossy median (chiefly basal) stripe; fronds several, laxly ascending, conform, not proliferous, 30 to 60 cm. long; stipes 7 to 20 cm. long, stramineous, bisulcate anteriorly, laxly paleaceous, the scales mostly minute, linear or filiform, the basal ones larger, oblong-lanceolate, concave; blades lanceolate to linear-lanceolate, acuminate, 23 to 40 cm. long, 5 to 8 (11) cm. broad in the basal

third, once-pinnate, the primary rachis similar to the stipe, minutely fibrillose-paleaceous; pinnae 15 to 25 pairs, mostly spreading, the basal ones one to three times their width apart, those above mostly adjacent (rarely subimbricate), variable in shape, linear to obliquely lance-oblong from an inequilateral auriculate base, 2.5 to 4 (5.5) cm. long, 8 to 13 (18) mm. broad, acute, mucronate, nearly straight, broadly serrate-crenate or obliquely lobed, the crenations or lobes often apiculate, the larger ones denticulate distally; basal auricles often rounded, those of the lowermost two or three pairs occasionally free or nearly so; upper pinnae rather abruptly reduced, semiadnate, the uppermost ones evident as oblique, broadly joined lobes of the foliose apex; leaf tissue rigidly chartaceous, the course of the veins evident in drying; pinnae freely fibrillose on both surfaces (the scales filiform, pale, minute) and minutely glandular-viscid; sori large, distant, borne in a single medial or supramedial line, or in groups of three to five in the larger lobes; indusium small, caducous, wanting or barely evident at early maturity of the sorus.

Type in the U. S. National Herbarium no. 1,045,780, collected about one mile below the railway station at Ipswich, St. Elizabeth, Jamaica, on a steep, partially shaded, rocky bank along the "Black River Road," April 1, 1920, by William R. Maxon and Ellsworth P. Killip (no. 1520). Specimens of this collection have been distributed to the New York Botanical Garden, the Gray Herbarium, the Field Museum, the University of Illinois, and the Herbarium of Prince Roland Bonaparte.

Polystichum killipii is related to *P. harrisii* Maxon, which is the common *Polystichum* of the Cockpit region of western Jamaica. That species differs constantly, however, in its darker rhizome scales and invariably flagelliform, proliferous blades, and in having the pinnae nonglandular and (at maturity) devoid of the filiform scales which, though minute and of a pale color, are a very noticeable feature of *P. killipii*. Scattered scales are present at first upon the under surface of the pinnae of *P. harrisii*, but they are substellate (the divisions terminating in dark distended cells) and are easily deciduous.

There is at hand also a specimen of *P. killipii* collected in the "Cockpit Country" near Troy, by Underwood (no. 2837), in May, 1903. This was discussed briefly by the writer in 1909[4] and at that time was regarded as perhaps representing a new species.

EXPLANATION OF PLATE 20.—Type specimen of *Polystichum killipii*. One-half natural size.

ATALOPTERIS, A NEW GENUS OF DRYOPTEROID FERNS FROM THE WEST INDIES.

During his second visit to Jamaica, in 1904, the writer collected at Hollymount, on the slopes of historic Mount Diabolo, a small, strikingly peculiar, terrestrial fern (no. 2228) with wholly dimorphic fertile and sterile leaves, which later was found to be closely allied to a little known Cuban species collected long ago by Charles Wright (no. 1827), described as *Polybotrya aspidioides* Griseb. in 1866, and subsequently (1868) transferred to *Acrostichum* by Baker, who had not seen specimens. Although obviously congeneric, the two species had nothing in common with *Acrostichum* save their complete dimorphism, and were strongly at variance also from *Polybotrya*, under

[4] Contr. U. S. Nat. Herb. **13**: 29.

which genus the Cuban plant was provisionally listed by Christensen in the Index Filicum.

In view of their uncertain systematic position, both plants were sent (in 1909) to Christ, who in Die Geographie der Farne (1910) referred them to *Psomiocarpa*, listing (but not describing) the Jamaican plant as a new species, *P. maxoni*. The genus *Psomiocarpa* Presl (1849) was regarded as consisting of three species: *Psomiocarpa apiifolia* J. Smith, the Philippine prototype; *P. aspidioides* (Griseb.) Christ, of Cuba; and the Jamaican *P. maxoni* Christ. Christ's conclusions as to extending *Psomiocarpa* to include the West Indian species, together with a brief characterization of the genus and three included species, were embodied in a short paper, "On *Psomiocarpa*, a neglected genus of ferns," published in the Smithsonian Miscellaneous Collections in 1911.

Somewhat later, Christensen, in discussing the minute morphology of the subgenus *Ctenitis* of *Dryopteris*, more particularly with respect to systematic status and relationship, wrote as follows:

> *Ctenitis* is not nearly related to the other subgenera of *Dryopteris* and in my opinion it is even not congeneric with them. On the other hand, it is intimately related to the genus *Psomiocarpa* Presl, recently restored by Christ, who referred to that genus two West Indian species, *Ps. aspidioides* (Griseb.) and *Ps. Maxoni* Christ. I know the first named of these species, which in habit, texture, colour, and pubescence is perfectly agreeing with *Ctenitis*; by its contracted fertile frond it differs, however, so much that it naturally must be placed in a separate genus, which can be regarded as a derivate of *Ctenitis*. *Psomiocarpa* was previously united with *Polybotrya*, which genus is more closely related to *Polystichum*.

It will be generally agreed that *Psomiocarpa* as understood by Christ forms no part of true *Polybotrya*, which is characterized by eremobryoid vernation and large, coarse, leathery fronds. It seems clear also to the writer that the Philippine *Psomiocarpa apiifolia* is not truly congeneric with the two West Indian species. This conclusion is shared by Mr. Christensen, who at the time he published the remarks above quoted (1913) knew *P. apiifolia* only from description and illustration. A new genus for the accommodation of the West Indian plants may, therefore, be described as follows:

Atalopteris Maxon & C. Chr., gen. nov.

Small, terrestrial dryopteroid ferns of rocky forest ravines, of lax habit. Rhizomes woody, short, decurved, clothed at the apex with a tuft of rigid attenuate scales; fronds numerous, fasciculate, ascending, completely dimorphous, the vascular parts persistently paleaceous. Sterile blades oblong to broadly ovate, nearly bipinnate, the lower pinnae not basiscopic; veins free, oblique, nearly reaching the margin; rachis and under side of the costae spreading-paleaceous, the scales clathrate, lance-attenuate, hair-pointed, broadly attached at the thickened subcordate base, distantly glandular-ciliolate or denticulate; costae, costules, and veins bearing scattering, closely appressed, pointed, several-celled, bicolorous hairs upon the upper side; leaf tissue thin-herbaceous, copi-

ously and minutely strigillose with thick uni-paucicellular glandular hairs upon both surfaces throughout, as upon all the vascular parts of the blade. Fertile blades one or two, nonfoliose, lanceolate or oblong, fully bipinnate; sori close or apart, subglobose, nonindusiate, borne laterally, a row upon either side of the elongate rachiform secondary divisions.

Species two. Type, *Polybotrya aspidioides* Griseb.

Atalopteris is most nearly related to *Psomiocarpa* Presl, which must be regarded as monotypic. Both genera are closely allied to the *Ctenitis* group of species still retained in *Dryopteris*, and both find their nearest allies in plants of their respective regions. Thus, *Psomiocarpa*, except in its free venation and consequently far greater dissection of the blade, agrees closely with the East Indian *Stenosemia* Presl, particularly in the suppression of scales and in the development of a copious covering of peculiar long, flattish, intestiniform hairs upon the rachis. In *Ataloptcris*, on the other hand, persistent divaricate scales are present upon the rachis and the lower side of the costae in abundance, and these agree so closely with the prevailing type of *Ctenitis* scales as to require no special description. The presence or absence of scales of this specialized kind is of basic importance, systematically. Thus, although *Psomiocarpa*, *Stenosemia*, *Ctenitis*, and *Atalopteris* are perhaps of common ancestry, it is obvious that their more recent evolution has progressed along two distinct lines, and that *Atalopteris* is closely related to *Ctenitis*, while *Psomiocarpa* and *Stenosemia* are not. From *Ctenitis*, whether its species be regarded as constituting either a proper genus or a subgenus of *Dryopteris*, *Atalopteris* is sufficiently distinct, however, in its complete dimorphism, an exactly analogous case being that of *Maxonia*, segregated from *Dryopteris* by Christensen, which is phylogenetically close to *Polybotrya*.

In its minutely glandular-strigillose surfaces, also, *Atalopteris* is not unlike certain species of the subgenus *Ctenitis;* for example, *Dryopteris nigrovenia* (Christ) C. Chr., which bears a fair number of short, turgid, apparently "unicellular" glandular hairs [6] in addition to long pluricellular ones. In the *Ctenitis* species showing this character such hairs are relatively inconspicuous, however, and are for the most part so readily abraded as to be barely evident at maturity. They are altogether lacking in *Psomiocarpa* and *Stenosemia*, but are a very conspicuous feature in *Atalopteris*. In the lax moniliform cilia of the segments, moreover, *Atalopteris* agrees with most species of *Ctenitis*, and in habit the resemblance to the smaller members of *Ctenitis* is close.

Taking all the characters together, therefore: If we admit *Psomiocarpa* and *Stenosemia* as distinct genera, partly on the basis of their dimorphism, and partly because of their minute characters, which show a wide departure from *Ctenitis*, we must place the West Indian plants in a separate new genus, since (1) their systematic agreement with *Psomiocarpa* is relatively remote and (2) their dimorphism is of generic importance in distincton from *Ctenitis*, with which group they are otherwise in very close relatonship.

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[6] Mr. Christensen, who has gone into the matter thoroughly, points out in a recent letter that these short, thick, glandular hairs which at first sight appear to be unicellular are not actually so; that they often show one or two constrictions, which may be due to contractions of the juice or to the presence of cell walls; that in some cases, at least, a cross wall near the base is clearly demonstrable; and that they are, in short, "glandular hairs with a cylindrical head." They are thus not to be confounded with the dry whitish hairs of the subgenera *Lastrea* and *Cyclosorus*, which are excrescences from a single epidermal cell and are truly unicellular, not being cut off by a cross wall.

The material of *Atalopteris* at hand is not wholly comparable as to maturity, and besides is not ample enough to permit a positive decision as to whether one or two species are represented. On the basis of the specimens now available the two forms are readily distinguished by the key given below. It may be, however, that these are merely states of a single variable species.

Fertile fronds much shorter than the sterile ones; blades of sterile fronds broadly ovate, abruptly short-acuminate, 20 to 25 cm. long, 12 to 15 cm. broad, the pinnules acuminate; segments 12 to 14 pairs, entire or nearly so, the veins (7 or 8 pairs) mostly simple; scales of the stipe and blade ferruginous, lax, with thin partition walls ---------- **1. A. aspidioides.**

Fertile fronds greatly exceeding the sterile ones; blades of sterile fronds ovate-oblong, acuminate, 13 to 17 cm. long, 6 to 8 cm. broad, the pinnules obtuse; segments 7 or 8 pairs, irregularly dentate-serrate, the veins (5 or 6 pairs) mostly forked; scales of the stipe and blade reddish brown, rigid, with thickened partition walls ---------- **2. A. maxoni.**

1. **Atalopteris aspidioides** (Griseb.) Maxon & C. Chr.

Polybotrya aspidioides Griseb. Cat. Pl. Cub. 276. 1866.

Acrostichum aspidoides Baker, in Hook. & Baker, Syn. Fil. 414. 1868.

Psomiocarpa aspidioides Christ, Geogr. Farne 297. 1910.

Cuba. Apparently known only from the original collection, *Wright* 1827.

2. **Atalopteris maxoni** (Christ) C. Chr.

Psomiocarpa maxoni Christ, Geogr. Farne 224. 1910, *nomen nudum;* Smiths. Misc. Coll. 56[23]: 2. *pl. 1; text fig. 1.* 1911.

Jamaica. Type in the U. S. National Herbarium, no. 520143, collected at Hollymount, slopes of Mount Diabolo, altitude about 750 meters, on rock slopes of wet forested ravine, May 25 to 27, 1904, by William R. Maxon (no. 2228). This species, also, has not as yet been recollected.

THREE NEW SPECIES OF DRYOPTERIS, SUBGENUS STIGMATOPTERIS.

The new genus *Stigmatopteris* was proposed by Christensen in 1909[6] for a small coherent group of tropical American ferns which had latterly been referred to *Dryopteris*, 12 species being recognized provisionally and figured. Several years later[7] the same author, in his extended treatment of the pinnatifid-bipinnatifid American species of *Dryopteris*, while still regarding *Stigmatopteris* as "a very natural genus (perhaps not even a member of the Dryopteridеae)," gave it the rank of a subgenus of *Dryopteris*, at the same time extending its limits to include 17 species. These were divided between two sections: *Eustigmatopteris* with 14 species, and *Peltochlaena* with 3. More recently Christensen has added[8] 3 species to the section *Eustigmatopteris*, making 20 for the whole subgenus.

Though apparently still regarding *Stigmatopteris* as a valid genus and though listing its species under this generic name, Christensen

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[6] Bot. Tidsskr. **29**: 291–304. *figs. 1–5.* 1909.

[7] Dansk. Vid. Selsk. VII. Naturv. Afd. **10**[2]: 53–282. 1913.

[8] Dansk. Vid. Selsk. VIII. Naturv. Afd. **6**[1]: 1–132. 1920.

makes it one of the 11 subgenera of *Dryopteris*. Whatever its rank may be, the morphological characters of the group are admirably stated by him, and the limits of the highly variable species are for the most part well defined. In a few cases the results reached have not been satisfactory. It thus becomes necessary to recognize at least three additional species, all of the section *Eustigmatopteris*. Descriptions of these follow, with notes on relationship.

Dryopteris nothochlaena Maxon, sp. nov.

Rhizome stout, erect, woody, with numerous very coarse, cordlike roots, paleaceous, the scales mostly lance-deltoid, hair-pointed, 8 to 14 mm. long, thin, seal brown, sublustrous, laxly and distantly long-fimbriate; fronds several, erect-spreading, 1.2 to 2 meters long; stipes 45 to 80 cm. long, 5 to 10 mm. thick, deeply sulcate anteriorly, light brown from a darker base, appressed-paleaceous, the scales similar to those of the rhizome, mostly deciduous with age; blades oblong-lanceolate, acuminate, 80 to 120 cm. long, 30 to 45 cm. broad, subbipinnate, the rachis similar to the stipe, deciduously paleaceous; pinnae about 25 pairs, spreading or laxly ascending, the lower pairs opposite or subopposite, short-stalked (2 to 5 mm.), and subdistant, the others subopposite or alternate, nearly sessile, contiguous, or subimbricate; characteristic middle pinnae linear or deltoid-linear from an inequilateral base, attenuate or subcaudate (the tip sharply serrate throughout), 15 to 23 cm. long, 2 to 5 cm. broad, pinnatifid to about 1 mm. from the elevated, distantly paleaceous costa; segments 25 to 30 pairs, oblique-spreading, narrowly joined by their decurrent bases (the proximal basal one invariably reduced, nearly or quite free), oblong-linear, distally acutish, 1 to 3 cm. long, 3 to 7 mm. broad, subfalcate, deeply serrate or in the outer part serrately incised, thin-herbaceous, coarsely glandular-punctate; costules minutely paleaceous beneath, the scales scattering, tawny or light brown, deeply bullate, ovate, attenuate to a filiform, sometimes cleft tip; veins usually 10 or 11 pairs, oblique, pellucid, simple or once forked less than half way to the margin, minutely paleaceous beneath like the costule; sori usually 5 or 6 pairs in the outer half of the segment (or sometimes all the veins fertile), inframedial, each subtended proximally by a deciduous scale similar to those of the costules and veins.

Type in the U. S. National Herbarium, nos. 428048–50, comprising a single frond, collected near Cuna Cuna Pass, Jamaica, altitude 800 meters, on wet wooded slopes, May 1, 1903, by William R. Maxon (no. 1738).

The following additional specimens are in the National Herbarium:

JAMAICA: Mansfield and adjoining properties, near Bath, alt. 300 to 500 meters, *Maxon* 2388. Second Breakfast Spring, near Tweedside, alt. 600 meters, *Underwood* 1613. Lower slopes of Mount Moses, alt. 600 to 750 meters, *Maxon* 1071. Slopes above Tweedside, alt. 600 to 900 meters, *Maxon* 970. Seamen's Valley, alt. 150 to 250 meters, *Maxon & Killip* 7. Cuna Cuna trail, above Mattis River, alt. 300 to 500 meters, *Maxon & Killip* 169. Between Morces Gap and Vinegar Hill, alt. 1,175 to 1500 meters, *Maxon & Killip* 716. Without locality, *Hart* 200.

In Christensen's key this Jamaican plant runs to *D. ichtiosma* (Sod.) C. Chr., under which species it is mentioned with the comment that "the specimens seen agree, as to the essential characters, very well with the andine type, although they very much resemble *S. caudata* by their acute, oblique segments, which are toothed throughout." Nevertheless the specimens referred to (all from the National Herbarium) are labeled by Christensen as a variety, and as a matter

of fact their agreement with *D. ichtiosma*, beyond their having falsely indusiate sori and dwarfed proximal basal segments, is not at all close. *D. ichtiosma*, as represented in the National Herbarium by fragments and photographs of *Sodiro* 2617, from Ecuador, these courteously forwarded from the Herbarium of Prince Roland Bonaparte, is well marked by its spreading segments, broader sinuses, more numerous, spreading, evident veins (14 to 17 pairs), more rounded, less oblique teeth, and much smaller immersed glands, as also by the character of the scales of the costae, costules, and veins.

Dryopteris hemiptera Maxon, sp. nov.

Rhizome not seen, presumably erect; fronds about 115 cm. long; stipe 55 cm. long, 3 to 6 mm. thick, pale brown from a darker base, deeply sulcate anteriorly, deciduously paleaceous, the scales mostly elongate, thin, light brown, laxly hair-pointed, distantly denticulate-fimbriate; blade broadly oblong, abruptly long-acuminate, 60 cm. long, 35 cm. broad at the middle, subbipinnate, the rachis similar to the stipe, with narrow lax subpersistent scales; main pinnae about 20 pairs, falcate, sessile, the two or three lower pairs spreading, distant (4 to 6 cm. apart in attachment), opposite, with the proximal basal segment dwarfed (6 to 8 mm. long) and nearly free; middle pinnae approximate, ascending, linear-lanceolate from an inequilateral base, long-attenuate (the subcaudate tips sharply serrate), 17 to 18 cm. long, 2.3 to 3 cm. broad, obliquely pinnatifid to about 1 or 1.5 mm. from the stout elevated costa, the inferior basal segment deltoid (about 6 mm. long, 4 mm. broad), nearly or quite free, arising from a narrow foliaceous wing short-decurrent upon the main rachis; intercalary segments upon the main rachis toward the apex of the blade similar, but with a broader decurrent base; main segments of the pinnae about 23 pairs, oblique, falcate, linear-oblong, submuticous or distally acute, 15 to 20 mm. long, 3.5 to 4 mm. broad, with narrowly obtuse sinuses, sharply low-serrate, thin-herbaceous, finely glandular-punctate; costules strongly elevated beneath, minutely paleaceous, the scales few, subpersistent, linear or filamentous, a few extending to the veins, these not at all bullate; veins 7 to 9 pairs, very oblique, elevated beneath, pellucid, mostly simple, arcuate; sori 4 to 6 pairs, supramedial, apparently not subtended by an indusiiform scale.

Type in the U. S. National Herbarium, no. 50172, collected in eastern Cuba in 1859 or 1860 by Charles Wright (no. 1053).

This was placed by Christensen with the Jamaican element referred to *D. ichtiosma*, but was indicated as a "forma dubia." The specimen at hand is somewhat abraded, but is otherwise complete, and appears to indicate a clearly distinct species. In comparison with *D. nothochlaena* it is distinguished by its even more oblique, strongly falcate segments, their much lower and sharper teeth, and fewer, more prominent, mostly simple, arcuate veins, as also by the seeming absence of a false indusial scale. It is set apart from all its immediate allies by the presence of short-decurrent, horizontal, deltoid, intercalary segments upon the main rachis from the middle portion upward, a character which has suggested the specific name.[9]

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[9] Two fronds of the type collection have recently been examined at the Gray Herbarium. One of these is larger than the type specimen, the frond (complete) measuring 132 cm. long (the stipe 60 cm., the blade 72 cm.); a single detached pinna measures 4 cm. broad. They are in excellent condition and show no trace of indusial scales, in this as in other respects being sharply distinguished from *D. nothochlaena*.

Dryopteris sordida Maxon, sp. nov.

Rhizome not seen, presumably erect; fronds at least 110 cm. long; stipes about 45 cm. long, 7 mm. thick at the base, sulcate anteriorly, castaneous beneath, supersistently paleaceous, the scales subappressed, dull brown, thin, narrowly deltoid, denticulate at the attenuate apex; blades very broadly oblong, abruptly acuminate, about 65 cm. long, 40 cm. broad, pinnate-pinnatifid, the rachis similar to the stipe, subfurfuraceous from the remnants of the peltate scales; pinnae about 18 pairs, spreading, the lowermost 2 or 3 pairs sessile or short-stalked (1 to 3 mm.), those above mostly semiadnate below, the upper ones fully adnate and short-decurrent, but only the uppermost ones joined; characteristic middle pinnae linear from a strongly inequilateral base, attenuate (the tip deeply and sharply serrate), 20 to 22 cm. long, 2.5 to 3 cm. broad, obtusely pinnatifid two-thirds the distance to the costa, the costa stramineous, strongly elevated beneath and sparsely appressed-paleaceous, the scales pale brown, thin, lax, peltate, irregularly lobed; lobes about 25 pairs, the distal basal one elongate and parallel to the rachis, the proximal basal one short, oblique, and partially adnate to the rachis, most of the lobes spreading, broadly oblong (becoming more oblique and deltoid-oblong toward the tip), rounded or at most acutish, 5 to 6 mm. broad above the rather broad subobtuse sinuses, the fertile ones subentire, the sterile ones sharply serrate; costules bearing a few minute pale elongate scales beneath; veins 7 to 9 pairs, oblique-spreading, mostly simple, elevated beneath and nearly devoid of scales; sori 5 to 7 pairs, nearly medial, an indusiiform scale wanting; leaf tissue dark green, membranous, finely pellucid-punctate with immersed glands.

Type in the U. S. National Herbarium, no. 826179, collected in forests near Cubilquitz, Alta Verapaz, Guatemala, altitude 350 meters, September, 1906, by H. von Türckheim (no. II. 1432). There is also a second identical sheet of the type collection. Specimens from Chiapas, collected by Purpus (no. 6870) in June, 1913, are referred here tentatively.

The type specimen of the present species is the plant mentioned by Christensen under *S. nephrodioides* as a form intermediate between that and *S. ichtiosma* and as perhaps representing a new species. The relationship to the latter species is certainly remote. From *D. nephrodioides*, as keyed and figured by Christensen, *D. sordida* differs notably in having the pinnae pinnatifid well below their middle, and in the less oblique, mostly obtuse segments (these never dentate) and more numerous veins, *D. nephrodioides* having only five or six pairs per segment.

MISCELLANEOUS NOTES.

Polypodium furfuraceum Schlecht. & Cham.

The range of this species, previously reported by the writer[19] as "common from Mexico to Panama, at 200 to 1,300 meters elevation, ascending casually to 1,750 meters," may now be extended to include Peru. The specimens referred to are from tree trunks in dry, open woods, Santa Ana, Peru, altitude about 900 meters, June 26, 1915, *Cook & Gilbert* 1510.

Polypodium rosei Maxon, Contr. U. S. Nat. Herb. **17**: 594. 1916.

Known hitherto only from Morelos and Jalisco. The following additional specimens are at hand from several localities in the vicinity of Morelia, State of Michoacán, alt. 1,950 to 2,200 meters: *Arsène* 5171, 6528, 6780, 6800, 10666. Some of these are larger than the original specimens and have more numerous pinnae.

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[19] Contr. U. S. Nat. Herb. **17**: 561. 1916.

Polypodium tweedianum Hook. Icon. Pl. 1: *pl. 86.* 1837.

Described and figured originally on a plant from "woods of St. Xavier, Tucumán," Argentina, *Tweedie* (which apparently has been lost at Kew), and recently reidentified by the writer[11] on the basis of specimens from Pinos, near Tarija, Bolivia, *Fiebrig* 3265, which in gross characters agreed much more closely with the description and original illustration than did the various Andean plants usually so referred. Substantiating specimens are now at hand from northern Argentina, those collected in the andine foothill region of Esquina Grande, Province of Salta, altitude 2,400 meters, by Pedro Jorgensen (no. 1249) in 1915 and at Las Pavas (*Jorgensen* 52) in 1916. These appear identical with the Fiebrig plant.

Cheilanthes wootoni Maxon, Proc. Biol. Soc. Washington **31: 146.** 1918.

A few fronds of this species were collected by the late Charles T. Druery in Sonora, between Nogales and Arispe, about 1895, and were transmitted by him with other ferns to the National Museum in 1905. This species is fairly common in Arizona and New Mexico and is known also from the vicinity of El Paso, Texas,[12] but has not hitherto been reported from Mexico.

Pellaea formosa (Liebm.) Maxon.

Allosorus pulchellus Mart. & Gal. Nouv. Mém. Acad. Sci. Brux. **15**[5]: 47. *pl. 10. f. 1.* 1842. Not *A. pulchellus* Presl, 1836.

Allosorus formosus Liebm. Dansk. Vid. Selsk. Skrivt. V. **1**: 220. 1849.

Pellaea pulchella Fée, Gen. Fil. 129. 1852.

The distinctions between this relatively coarse fern of southern and eastern Mexico and *P. microphylla* Mett., a rare and comparatively delicate plant of northern Mexico and the arid southwestern United States, have recently been well pointed out by Weatherby,[13] who figures both. A new name for the former species is, however, required under the American rules, *Allosorus pulchellus* of Martens and Galeotti (1842) being invalidated by Presl's earlier use of the same name. Fortunately, Liebmann's name is available.

The following specimens of *P. formosa* are in the U. S. National Herbarium:

CHIAPAS: Without locality, 1864–1870, *Ghiesbreght* 227.

OAXACA: Las Sedas, alt. 1,800 meters, *C. L. Smith* 2080.

PUEBLA: Near Tehuacán, *Rose, Painter & Rose* 10127. Tetele, alt. 2,170 meters. *Arsène* 7130.

SAN LUIS POTOSÍ: Minas de San Rafael, *Purpus* 4882a.

VERACRUZ: Escamella, region of Orizaba, *Bourgeau* 2894. Mount Orizaba, *Spence* 78. Huatusco, April, 1857, *Mohr.*

BAJA CALIFORNIA: San Cristóbal, 1899, *Münsch.*

Pellaea lozani Maxon, Contr. U. S. Nat. Herb. **10**: 500. 1908.

The following additional specimens of this species have been observed:

GUERRERO: Río Balsas, August 26, 1910, *Orcutt* 4188.

FEDERAL DISTRICT: Lava beds near Eslava, alt. 2,400 meters, July 19, 1910, *Rusby* 368.

Pityrogramma schizophylla (Baker) Maxon.

Gymnogramme schizophylla Baker, Journ. Bot. Brit. & For. **15**: 266. 1877.

Anogramma schizophylla Diels in Engl. & Prantl, Pflanzenfam. **1**[4]: 258. 1899.

Psilogramme schizophylla Underw. Bull. Torrey Club **29**: 629. 1902.

Founded on specimens collected at Old England, Jamaica, by Miss Taylor and since found in one or two additional localities in Jamaica, as also in

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[11] Contr. U. S. Nat. Herb. **17**: 574, 575. *pl. 39.* 1916.

[12] Amer. Fern Journ. **9**: 5. 1919.

[13] Amer. Fern Journ. **8**: 104–109. *pl. 5.* 1918.

Haiti (*Leonard* 4772, 4774). Reported from Cuba by Christensen,[14] presumably from the erroneous reduction of *G. eggersii*. See under the next species.

Pityrogramma eggersii (Christ) Maxon.

Gymnogramme eggersii Christ, Bull. Soc. Bot. Belg. **33**[2]: 92. 1894.

Anogramma eggersii Christ; C. Chr. Ind. Fil. 58. 1905.

Founded on small specimens collected in forest near Jaguey, Oriente, Cuba, March, 1889, by Eggers (no. 4882a). This collection has not been seen by the writer. Agreeing with the description in most characters except those consequent upon the greater size and development of the plant, however, are the following specimens, in the herbarium of the New York Botanical Garden: Loma de la Gloria, Banao Mountains, Santa Clara Province, Cuba, altitude about 900 meters, July, 1918, *Leon & Roca* 7949, 7966, 7974, 8444. These show rather wide variation in dissection of the lamina, but scarcely more than is to be seen in *P. sulphurea* (Swartz) Maxon,[15] of the Greater Antilles.

This species is nearest related to *P. schizophylla*, to which (under Gymnogramme) it was reduced in 1897,[16] but from which it is amply distinct in its very long stipes (these dark brown and strongly sclerotic only toward the base), its pale brown to greenish or stramineous (not polished, dark brown) rachises, its longer, strongly oblique, and long-stalked pinnae, its much larger, narrowly long-cuneate, nondivaricate segments, and its more numerous, though scattered, wax glands beneath. These two species and the strongly ceraceous *P. sulphurea* are closely related, but form no more than a subgroup of *Pityrogramma*, since through the last-mentioned species and *P. chrysophylla* (Swartz) Link their affinity with the commoner, widespread species of the genus is readily apparent.

Asplenium heterochroum Kunze.

In the writer's revision of *Asplenium trichomanes* and its American allies,[17] *A. heterochroum* was reported from Cuba, Florida, and Bermuda, with citation of numerous collections. This species occurs also in Porto Rico, the following specimns being at hand: Clefts of rocks, near Bayamon, *Underwood & Griggs* 858; Finca Besosa, Bayamon, *Hioram* 328; Hato Arriba, near Arecibo, *Britton & Cowell* 1985. Of these, the last are the largest and most characteristic.

At page 141 of the paper mentioned, Bermuda specimens are cited, through a typographical error, as collected by the writer. They were actually collected by Mr. Faxon.

Dryopteris (Meniscium) **anceps** Maxon, nom. nov.

? *Heteroneuron meniscioides* Fée, Hist. Acrost. 93. *pl. 55, f. 4.* 1845.

Acrostichum fendleri Baker, Journ. Bot. Brit. & For. **25**: 100. 1887.

Leptochilus fendleri C. Chr. Bot. Tidsskr. **26**: 285. 1904.

In describing *Acrostichum fendleri*, on Fendler's no. 88, from Trinidad, Baker called attention to the fact that "the venation is strictly that of Meniscium, in which genus Eaton placed it."[18] The general form and venation of the sterile fronds are, indeed, in such complete agreement with the American species of

---

[14] Ind. Fil. 59. 1905,

[15] Contr. U. S. Nat. Herb. **17**: 173. 1913.

[16] Bot. Jahrb. Engler **24**: 134.

[17] Contr. U. S. Nat. Herb. **17**: 134–153. 1913.

[18] In Christensen's Index Filicum the name *Meniscium fendleri* is ascribed to Eaton, Bot. Gaz. **3**: 89. 1878, but this name is not given there or elsewhere, so far as the writer can find. In Eaton's second list of determinations of Fendler's Trinidad ferns (op. cit. **5**: 121. 1880) no. 88 is listed as *Meniscium reticulatum* L.

Meniscium that there can be no doubt that it should be associated with them in the subgenus Meniscium of Dryopteris. In referring the plant to Acrostichum, section Gymnopteris, Baker appears to have been misled by the dimorphism of the fronds; but the tendency toward completely fertile and completely sterile fronds is seen in several other species of Meniscium, notably *D. angustifolia* (Willd.) Urban, though in none is it quite so pronounced as in the present species. The reduction and nearly complete suppression of excurrent veinlets in the fertile fronds is a conspicuous feature, but this also is merely an extreme example of a disposition observed in other species of the group. Stellate hairs have not been noted; the sporangia are conspicuously long-setose.

Fée's *Heteroneuron meniscioides*, founded on a fertile frond collected near Bahia, Brazil, by Blanchet, appears to be the same; but unfortunately both this name and the one given by Baker are preoccupied in Dryopteris, necessitating a new name, as above. Jenman, in publishing Baker's description, mentions the plant as occurring in Guiana, which gives the species an entirely natural range.

The following specimens are in the National Herbarium:

TRINIDAD: Type collection, *Fendler* 88 (four sheets). Near Brazil, in forest, *Britton, Britton & Freeman* 2142.

TOBAGO: Between Roxborough and Parlatuvier, in mountain forest; terrestrial; July 26, 1914, *Broadway* 4904.

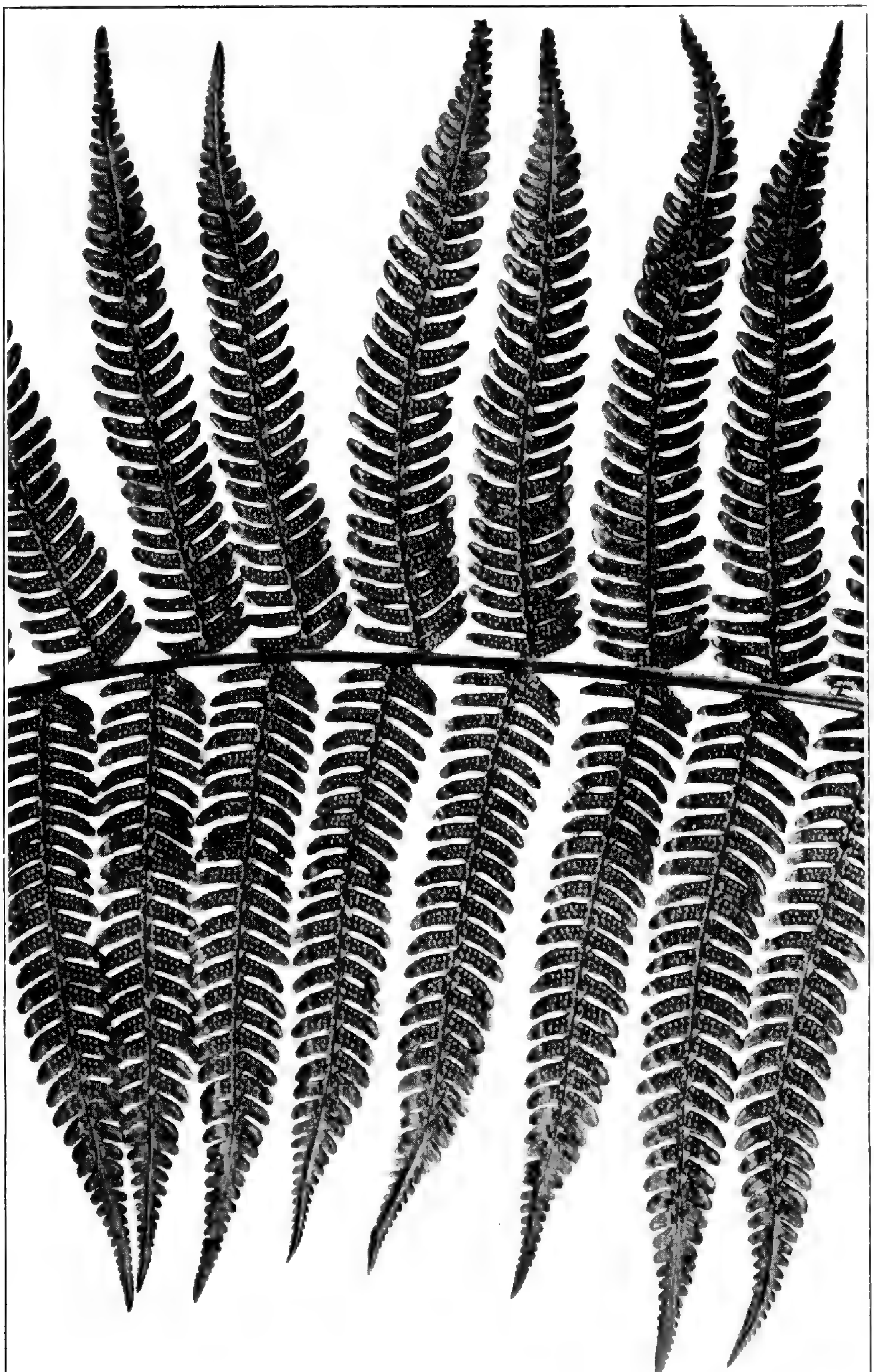
Dryopteris dissimulans Maxon & C. Chr. Dansk. Vid. Selsk. VII. Naturv. Afd. 10²: 215. 1913.

This species, founded on *Eggers* 4958, from the vicinity of Jaguey, Oriente, Cuba, is now represented by several additional collections recently received by the National Herbarium:

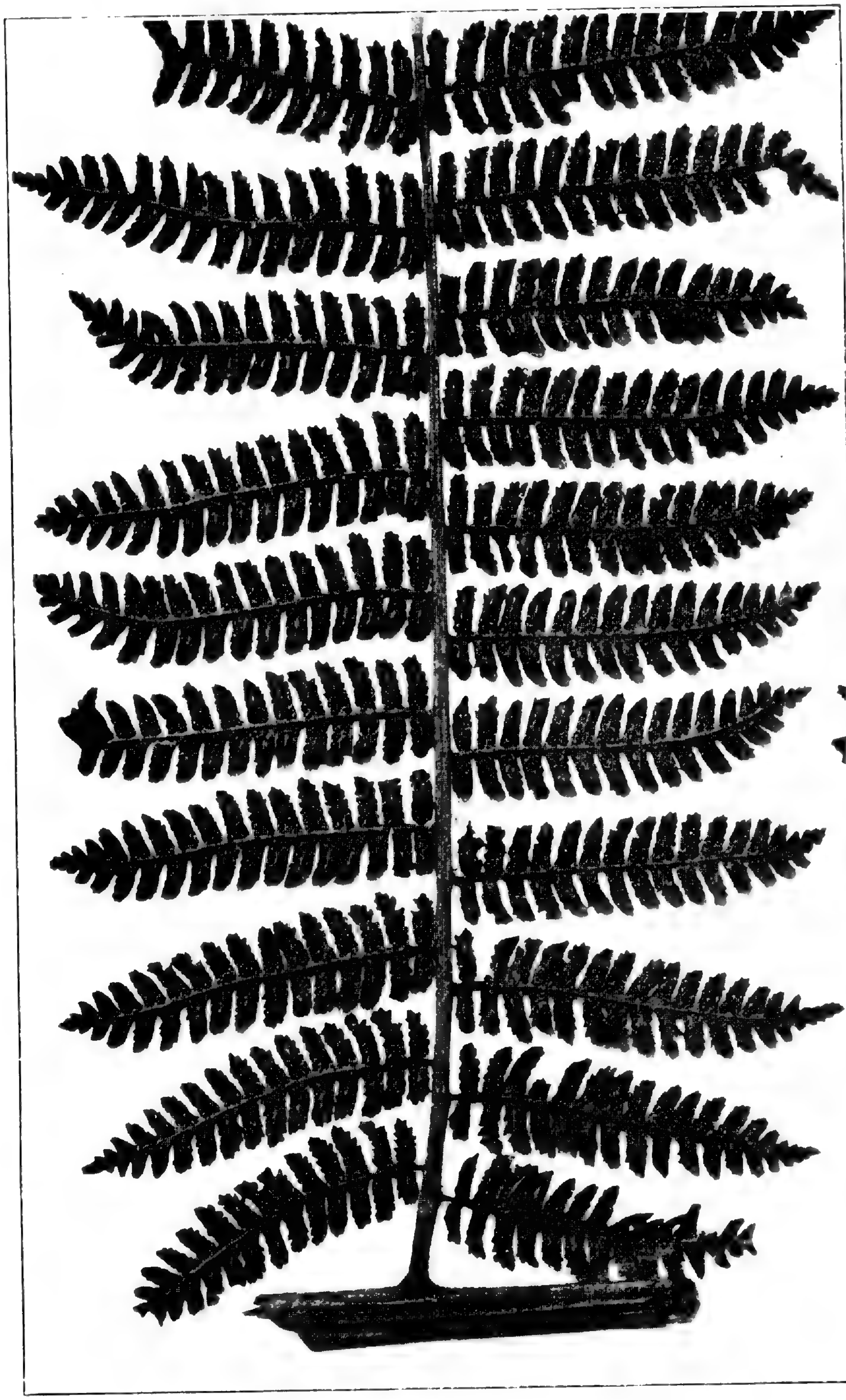
CUBA: Arroyo de Manaca, Herradura, Trinidad Mountains, Santa Clara, alt. 320 meters, *Britton & Britton* 4994 in part (the balance of the number being *D. sagittata*). Las Ninfas, *Hioram* 1454 in part (mixed with *D. sagittata*), 1496 in part (mixed with *D. sagittata* and *D. cordata*), 1717.

The further records of the close association of this plant with *D. sagittata* lend support to Mr. Christensen's suggestion as to its hybrid nature with *D. sagittata* one of its parents, especially since *D. scolopendrioides* (L.) Kuntze, the other suspected parent, was collected with it by Brother Hioram.

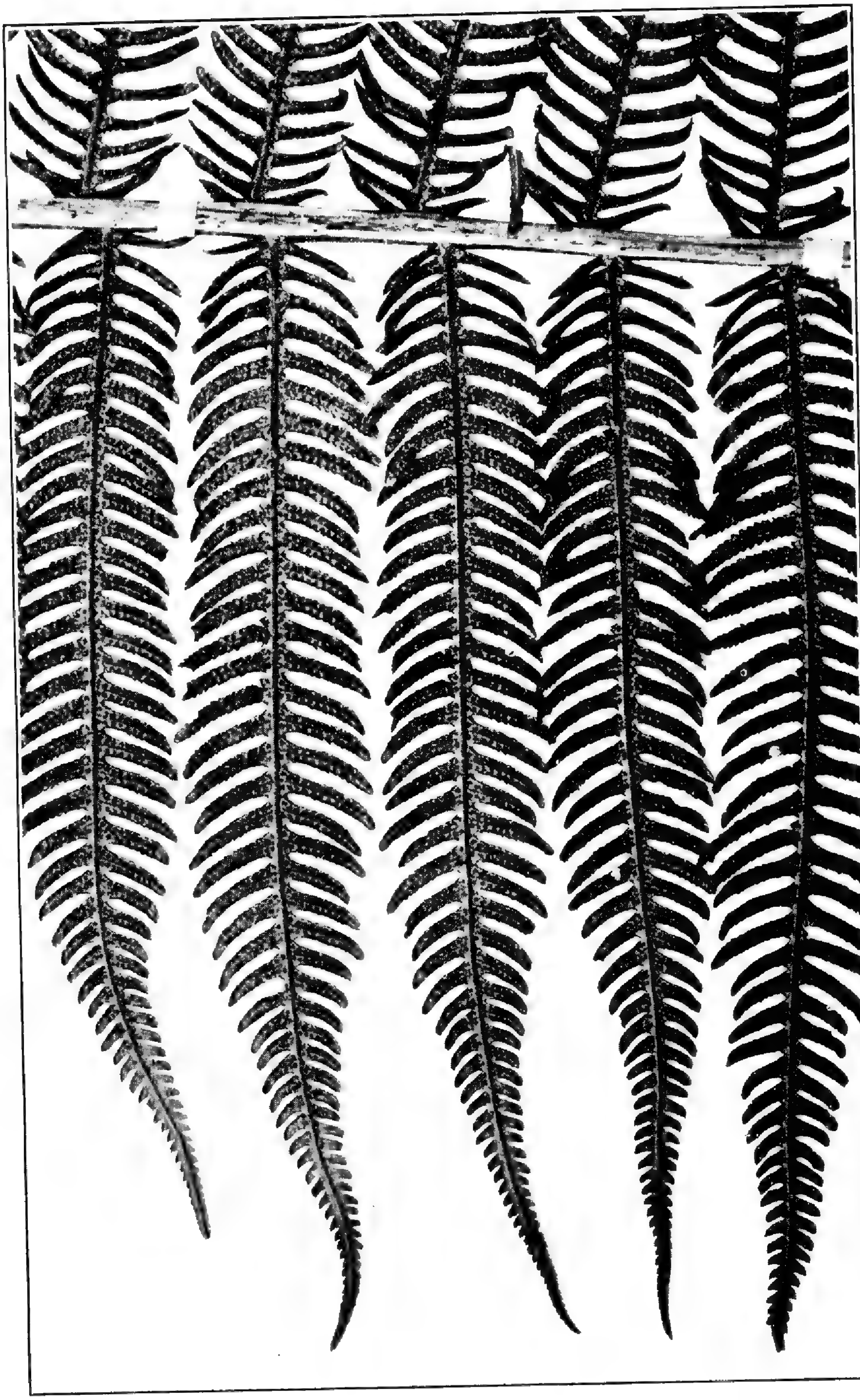
NOTE.—While this paper was in the printers' hands a letter was received from Mr. Christensen stating that *Atalopteris* occurs also in Haiti and that the specimen in question (collected by Ekman) tends to invalidate the supposed distinctions between *A. aspidioides* and *A. maxoni* (see p. 57). The writer hopes to examine and report upon this specimen later.



ALSOPHILA STRIGILLOSA MAXON.



ALSOPHILA NOTABILIS MAXON.



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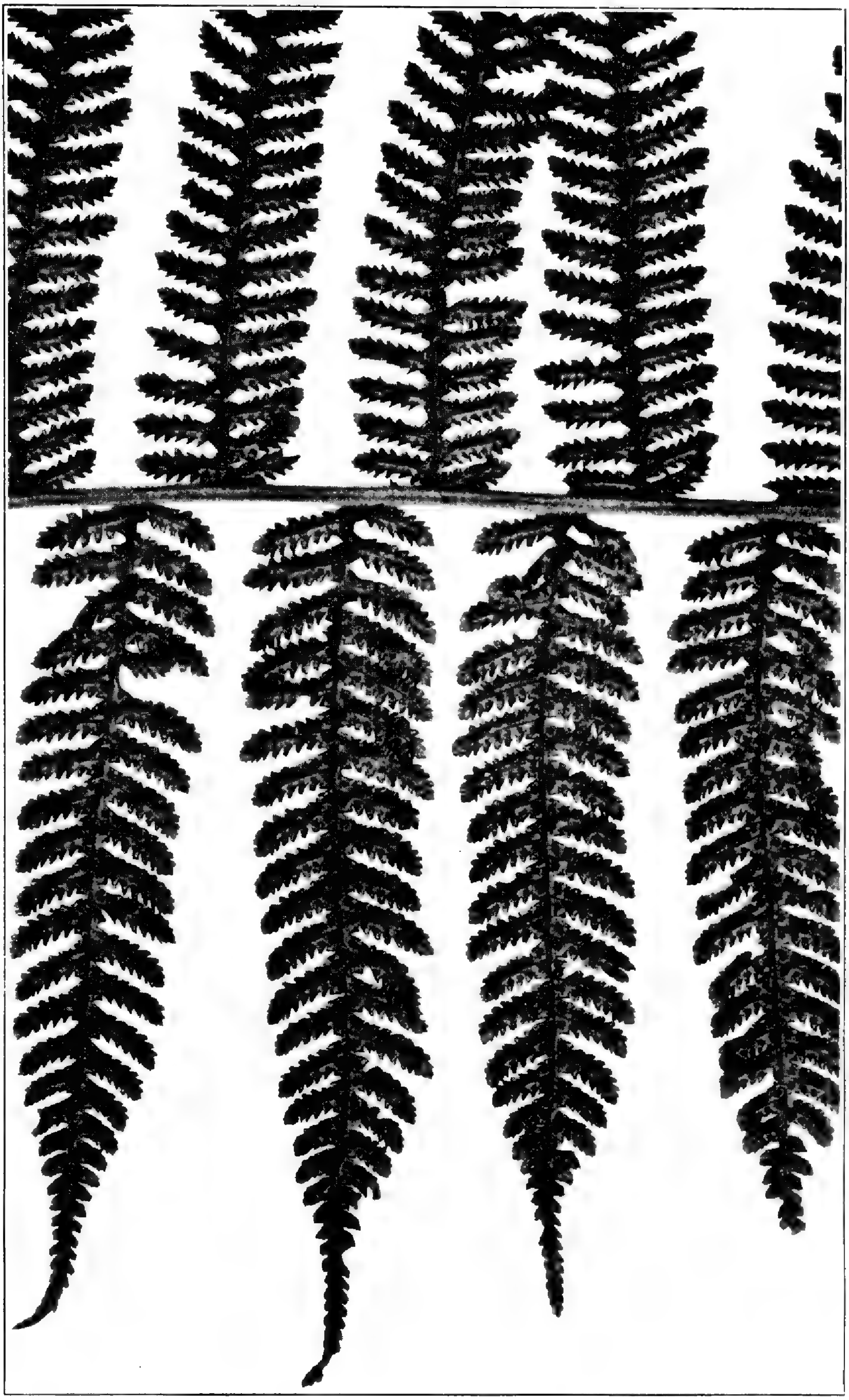
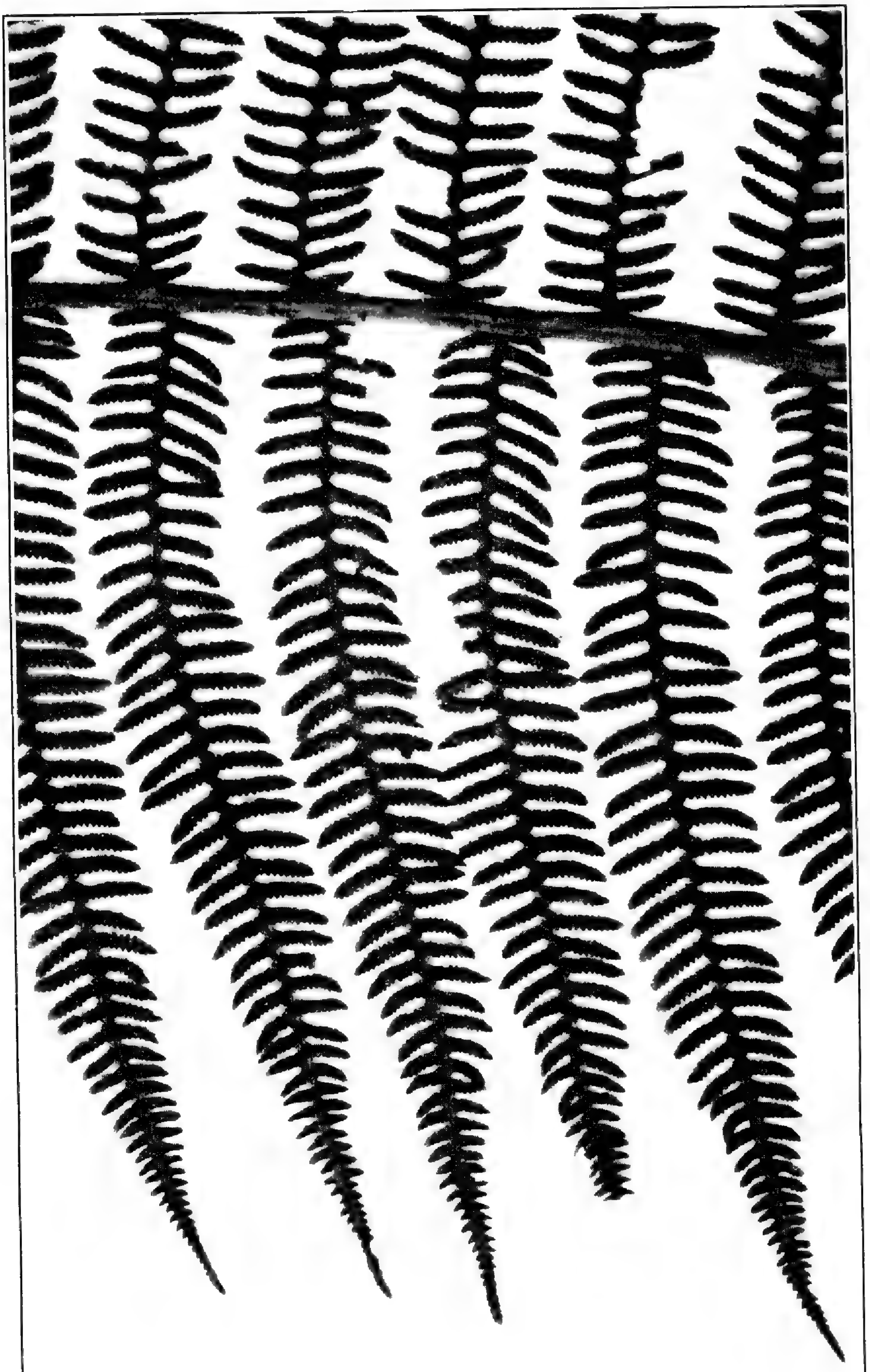
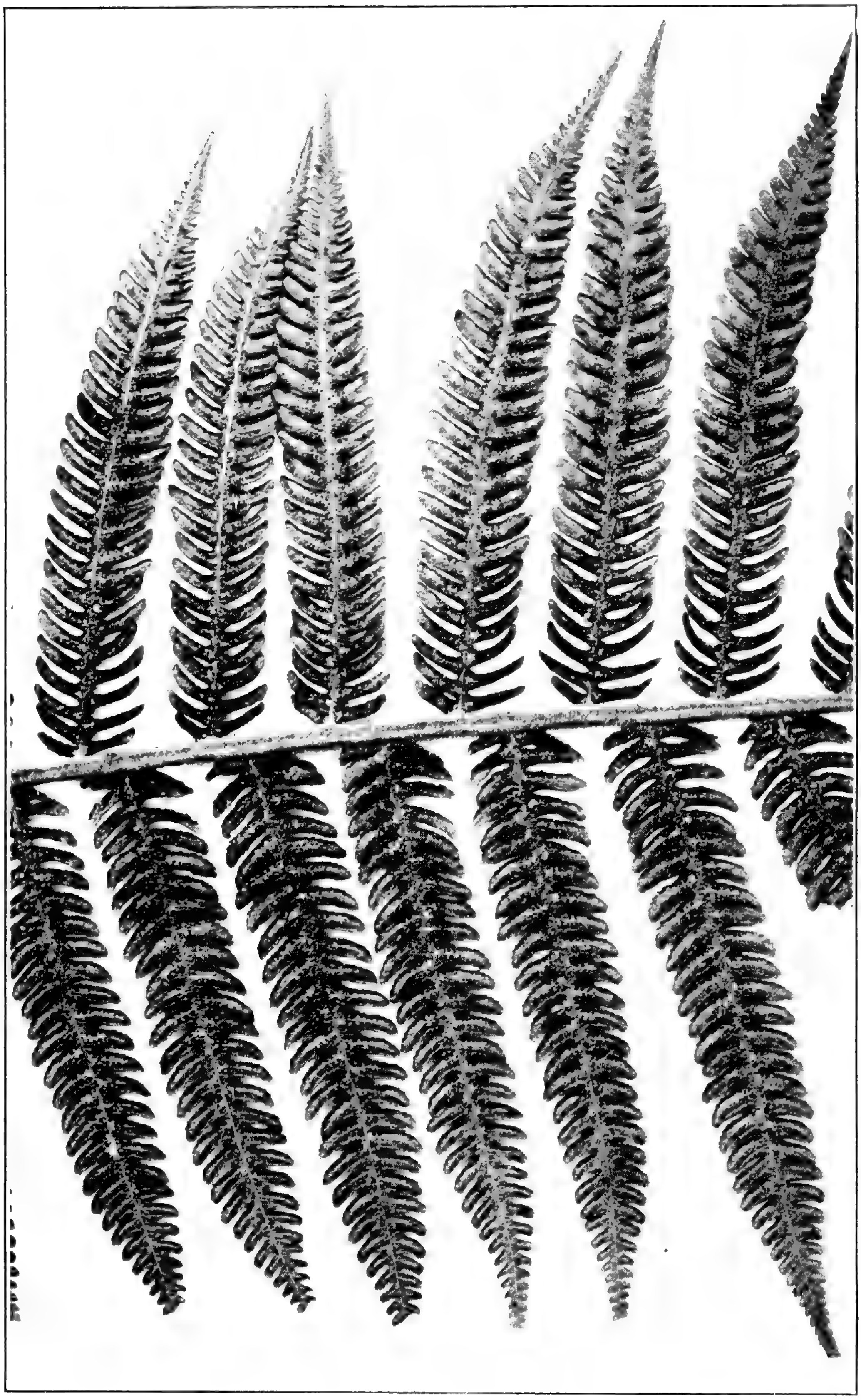


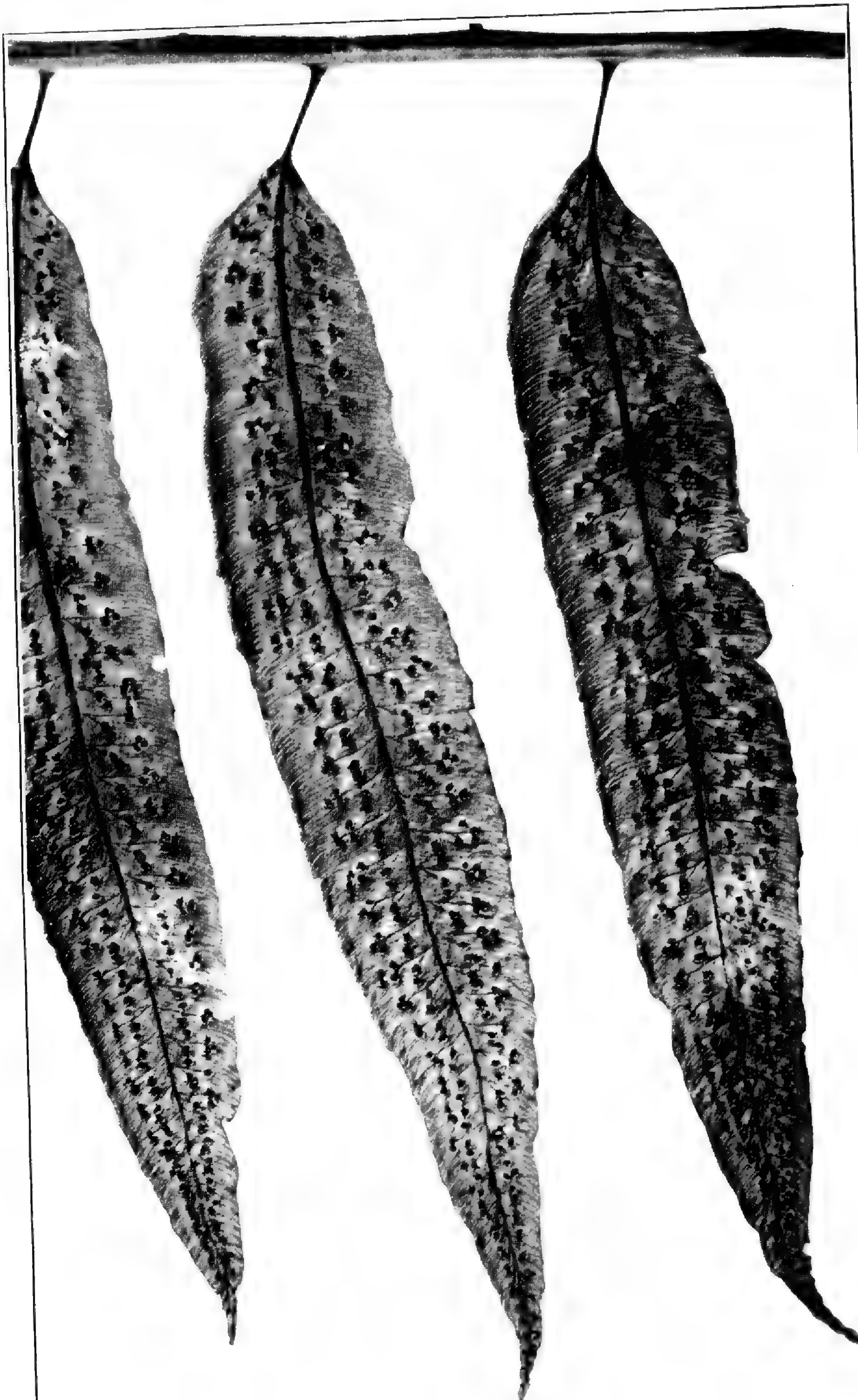
ALSOPHILA ACUTIDENS CHRIST.



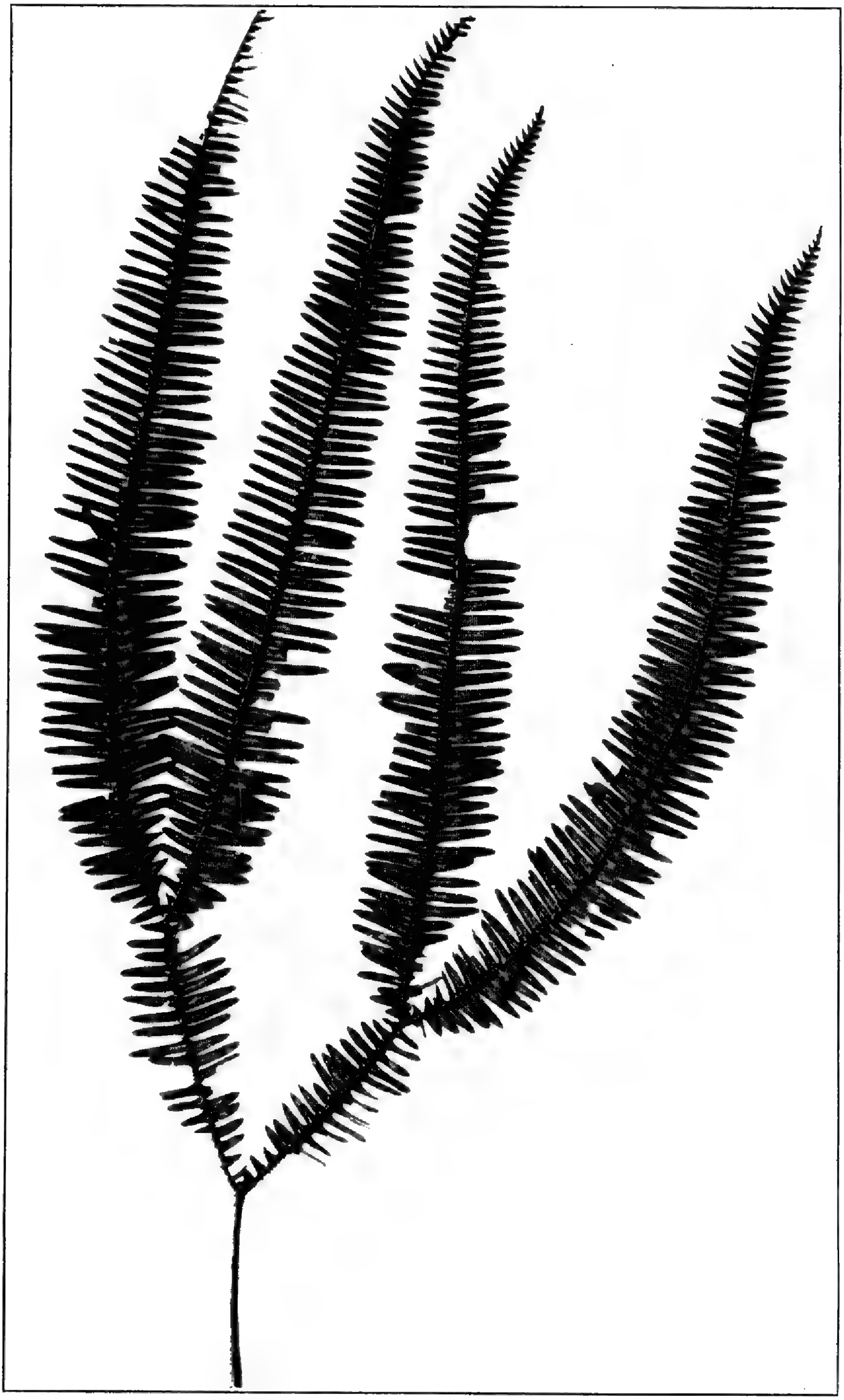
ALSOPHILA TRICHIATA MAXON.



ALSOPHIA SWARTZIANA MART.



ALSOPHILA WILLIAMSII MAXON.



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POLYSTICHUM DEMINUENS MAXON.

POLYSTICHUM KILLIPII MAXON.

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VOLUME 24, PART 3

KEY TO THE GENUS DIPLOSTEPHIUM, WITH DESCRIPTIONS OF NEW SPECIES

By S. F. BLAKE

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1922

PREFACE.

This number of the Contributions consists of a revision of the genus *Diplostephium* by Dr. S. F. Blake, of the Bureau of Plant Industry, U. S. Department of Agriculture, prepared in connection with his studies of the collections made by Professor Henry Pittier in South America. *Diplostephium* is a genus of the family Asteraceae related to *Aster*, but distinguished by its shrubby habit in addition to technical characters. Forty-one species are recognized, of which 13 are described as new. Since several of the species previously described are not represented in the herbaria of this country, the revision has been limited to a key, with descriptions of the new species and notes on the diagnostic characters of the others. The work is based on material in the Gray Herbarium and the herbarium of the New York Botanical Garden, in addition to that in the United States National Herbarium.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

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KEY TO THE GENUS DIPLOSTEPHIUM, WITH DESCRIPTIONS OF NEW SPECIES.

By S. F. Blake.

INTRODUCTION.

The genus *Diplostephium*, described by Kunth in 1820, was based on the single species *D. lavandulifolium*, from the mountains of Ecuador. It was distinguished from *Aster* by its distinctly double pappus, the outer squamellate-paleaceous and very short, the inner long and setose. At the hands of the early workers on Asteraceae—Cassini, Nees, and De Candolle—it became a confused medley of unrelated species having little in common beyond a more or less distinctly double pappus. Weddell, in 1857, limited it to a group of Andean shrubs or undershrubs. His concept of the genus was adopted by Bentham and Hooker and by Hoffmann, and his treatment has remained up to the present time the only synopsis of the genus. Weddell described 17 species, many of them new, and included all the species properly belonging to the genus which were known in his day, with the exception of *D. ochraceum*, which for some reason was omitted. His division of the species into groups has been followed with some amplification in the present paper, as it appears to offer the easiest method for the determination of the species. It is possible that the structure of the styles and of the outer pappus may be used for a more natural classification, but the material available in this country is not sufficient for a thorough revision at the present time.

Since Weddell's revision a considerable number of species have been described by Hieronymus and Rusby. Thirteen others are here added, chiefly from the South American collections of Pittier and Rose, bringing the total number of apparently distinct species to 40, with an additional species of doubtful position.

Although the 40 species of *Diplostephium* form a compact group of undoubtedly closely related species, they can not be said to constitute a technically well-defined genus. In a group where characters are so slight and variable as are those in the subtribe Asterinae

(Heterochromeae), and where the number of species is so great, the maintenance of a group of such size—composed of species whose relationship is evident and whose recognition is easy—as a distinct genus is justifiable. The closest relatives of *Diplostephium*, both structurally and geographically, are the genera *Hinterhubera* Schultz Bip. and *Chiliotrichum* Cass. Both are similar in habit to *Diplostephium;* the former is separable by its more or less irregularly three to five-fid ligules, the latter by the copious elongate deciduous receptacular pales, which are much more developed than those sometimes found in *Diplostephium.*

Owing to the fact that material of practically a third of the species here recognized is not available for examination in this country, it has seemed best to limit this revision of the genus to a key, with a list of the species and their synonymy and range. A thorough revision of the genus would require the reexamination of the types of many of the species published by Weddell and Hieronymus. The descriptions of Weddell, while in general excellent, are frequently deficient in measurements, which are of considerable importance in this group. Those of Hieronymus are, as usual, very full and enable his species to be keyed satisfactorily, but do not in any case state the structure of the styles.

The genus is of no importance economically, and I have not found a single native name or use recorded for any of the species. It has its center of distribution in Colombia, where 22 species occur, representing all the groups of the genus. The detailed distribution of the species is as follows: Costa Rica, 1; Colombia 22, of which 3 occur also in Ecuador and 1 doubtfully in Venezuela; Venezuela, 1, plus one doubtful record of a Colombian species; Ecuador, 9, of which 3 occur also in Colombia and 1 doubtfully in Peru; Peru, 8, of which 1 occurs also in Chile, with an additional doubtful record of an Ecuadorian species; Chile, 2,[1] of which 1 occurs also in Peru, while the other is of doubtful identification; Bolivia, 1 (Weddell's record of an additional species, *D. haenkei*, probably appertains to *D. sejaense*). Two species, *D. phylicoides* (H. B. K.) Wedd. and *D. ochraceum* (H. B. K.) Nees, are of uncertain habitat, doubtless Colombian or Ecuadorian.

The most interesting feature in the morphology of *Diplostephium* is found in the variation exhibited by the styles of the disk flowers.

[1] The identity of one of the two species recorded by Reiche from Chile, *D. lavandulifolium*, is open to doubt. See remarks under this species, p. 74. *D. tacorense* Hieron. was described from near Tacora, Peru, but this locality is apparently now included within the limits of Chile. In any case, the species occurs so near Chile that it is likely to be found in that country. It is not accredited to Chile in this enumeration.

In some species the branches of the style are very short, papillose, and only slightly divergent. This type of style is well shown in Weddell's figure (*pl. 36, f. B, 7*) of *D. floribundum*. The opposite extreme, of long and attenuate hispid style branches, is shown in the same plate (*f. A, 3, 4*) in *D. lavandulifolium*, and the intermediate stage found in *D. anactinotum* is also figured by Weddell (*pl. 35, f. B, 6*). Although not described by Hieronymus in any of his species, the characters of the style are known in practically all the other species, and these may be listed as follows:

1. Style more or less clavate, merely bifid or even subentire, the branches very short, ovate, usually obtuse, merely papillose: *D. rosmarinifolium*, *D. baccharideum*, *D. revolutum* (all of the Series *Rosmarinifolia*); *D. rupestre*, *D. eriphorum*, *D. phylicoides*, *D. pleistogynum*, *D. costaricense*, *D. cochense*, *D. schultzii* (Series *Rupestria*); *D. floribundum* (Series *Floribunda*); *D. ochraceum?* (Series *Denticulata*).

2. Style branches of medium length, oblong, oblong-linear, or lanceolate, acute, merely papillose (so far as known): *D. anactinotum*, *D. parvifolium* (Series *Lavandulifolia*); *D. cyparissias* (*Rosmarinifolia*); *D. weddellii* (*Rupestria*). An intermediate from between this type and the next, with linear, acute, papillose-hispidulous branches of medium length, is found in *D. umbelliferum* (*Rupestria*), and a similar form with somewhat longer style branches in *D. tacorense* (*Lavandulifolia*); another intermediate form, with lanceolate, acuminate, hispidulous branches, occurs in *D. denticulatum* (*Denticulata*).

3. Style branches elongate, linear-subulate, acuminate, hispidulous or hispid, or rarely scarcely more than papillose dorsally: *D. meyenii*, *D. adenachaenium*, *D. empetrifolium*, *D. lavandulifolium*, *D. hartwegii*, *D. macrocephalum*, *D. spinulosum*, *D. cicatricosum*, *D. oblanceolatum* (*Lavandulifolia*); *D. carabayense* (*Rosmarinifolia*); *D. sejaense*, *D. lechleri* (*Rupestria*); *D. haenkei* (*Floribunda*); *D. bicolor* (*Denticulata*). In *D. pycnophyllum* (*Lavandulifolia*) the form of the style branches is the same, but they are merely papillose, not obviously hispidulous.

The primitive type is probably the second one described, with oblong to lanceolate, acute style branches of medium length, and the other two types are doubtless derived from it. In any case, it is evident that the styles of the type first described, whether derived from the second or the third type, are the result of a process which would have as an end product the production of completely sterile disk flowers with an undivided style. Such a process, working in another tribe of Asteraceae (Heliantheae), has resulted in the production of a considerable number of genera now segregated as a sub-

tribe, the Melampodinae; and the members of this subtribe are shown by other characters to be derived from at least two other subtribes of Heliantheae, the Verbesininae and the Coreopsidinae. If now, in the case of *Diplostephium*, the process of sterilization were to go on to its conclusion in those species in which it has begun, and the comparatively small number of species with styles of intermediate character were to die out, or to follow their more advanced relatives, two groups would be left which might readily be taken as of generic value. The significant point is that the new genus thus formed would be in a sense of polyphyletic origin, having been derived from representatives of at least three fairly well distinguished groups of the parent genus.

This revision is based primarily on the material in the United States National Herbarium. In addition, the material in the Gray Herbarium and the herbarium of the New York Botanical Garden has been examined, through the kindness of the curators. The herbaria in which the specimens cited are deposited are indicated by letters (G=Gray Herbarium; N=U. S. National Herbarium; Y=herbarium of the New York Botanical Garden).

SYSTEMATIC TREATMENT.

DIPLOSTEPHIUM H. B. K.

Diplostephium H. B. K. Nov. Gen. & Sp. **4**: 96. *pl. 335*. 1820.
Diplostephium section *Amphistephium* DC. Prodr. **5**: 273. 1836, in part.
Simblocline DC. Prodr. **5**: 297. 1836.
Linochilus Benth. Pl. Hartw. 197. 1845.

Low shrubs, more or less tomentose or lanate; leaves alternate, linear to oval-ovate or oblong, entire or rarely toothed, sessile or petioled, usually coriaceous, more or less revolute-margined, tomentose or lanate at least beneath; heads solitary at tips of branchlets or corymbose-panicled, sessile or usually pedicellate, heterogamous, radiate, many-flowered, the rays white to purple, rarely yellowish (?) or brownish (?), the disk usually, or perhaps always, whitish at first, often changing to purple; involucre campanulate, several-seriate, graduated, of indurated ovate to linear-lanceolate phyllaries with thinner margins, usually strongly recurved-spreading in age; receptacle flat or slightly convex, foveolate, rarely bearing minute paleae toward the center; ray flowers pistillate, fertile, the ligules linear or elliptic, 2 or 3-denticulate, spreading or rarely very short and suberect; disk flowers hermaphrodite, fertile or often sterile, their corollas regular, tubular, with shallowly or deeply 5-fid limb; anthers cordate-sagittate at base, with ovate terminal appendages; style branches variable, now very short, erect, ovate, rounded, and merely papillose, now elongate, linear-subulate, acuminate, hispidulous; achenes of the disk narrow, 3 to 5-ribbed, of the ray more compressed, glabrous, glandular, or hispid; pappus usually copious, more or less distinctly double, the outer of short bristles or squamellate, the inner longer, setose, the bristles scabrous or barbellate, sometimes obscurely dilated toward apex.

Type species, *Diplostephium lavandulifolium* H. B. K.

KEY TO SERIES.

Heads solitary at tips of stem and branches_____ **1. Lavandulifolia.**
Heads several or many at tips of stem and branches, cymose or cymose-panicled.
  Leaves strictly linear or slightly spatulate-linear, 2 mm. wide or less (rarely slightly wider in nos. 17 and 20)_____ **2. Rosmarinifolia.**
  Leaves linear-lanceolate to oblong or obovate, rarely linear, 3 to 30 mm. wide (if rarely narrower, not strictly linear).
    Leaves entire (rarely with a few irregular teeth in no. 24).
      Leaves not obviously venose beneath, the veins concealed by the tomentum_____ **3. Rupestria.**
      Leaves evidently venose beneath_____ **4. Floribunda.**
    Leaves regularly denticulate or dentate_____ **5. Denticulata.**

KEY TO SPECIES.

1. Lavandulifolia.

Ligules shorter than their styles and the disk; leaves elliptic or obovate, 5 to 10 mm. long, 3 to 4 mm. wide; Colombia_____ **1. D. anactinotum.**
Ligules with the lamina 3 to 13 mm. long, surpassing the styles and the disk; leaves linear to oblong.
Involucre 4 to 8 mm. high.
  Leaves strictly linear, 8 to 30 mm. long, 1 to 1.5 mm. wide.
    Leaves 20 to 30 mm. long; Peru_____ **2. D. meyenii.**
    Leaves 8 to 16 mm. long; Peru_____ **3. D. tacorense.**
  Leaves linear-lanceolate to oblong, or if linear 8 mm. long or less.
    Leaves chiefly linear-oblong, distinctly short-petioled; Colombia. **4. D. adenachaenium.**
    Leaves linear-lanceolate or linear, sessile.
      Leaves acute or acutish, mucronate or mucronulate; involucre 7 to 8 mm. high.
        Leaves 2.5 to 5 mm. long, 0.8 to 1 mm. wide, strongly impressed-punctate above; pappus rufidulous or purplish; Ecuador, Peru (?)_____ **5. D. empetrifolium.**
        Leaves 7 to 8 mm. long, 2 mm. wide, not impressed-punctate above (?); pappus fleshy white, the outer bristles yellowish white; Peru. **6. D. jelskii.**
      Leaves obtuse or acutish, not mucronate; involucre 4 to 6 mm. high.
        Leaves with a resinous coating above; Colombia__ **7. D. parvifolium.**
        Leaves without a resinous coat above.
          Involucre about 6 mm. high.
            Involucre and leaves beneath densely appressed-tomentose with whitish hairs; Ecuador_____ **8. D. lavandulifolium.**
            Involucre and leaves beneath loosely cinereous- or ferruginous-tomentose; Colombia, Ecuador_____ **9. D. hartwegii.**
          Involucre 4 to 5 mm. high.
            Phyllaries acute, greenish; pappus reddish or violascent, 3.5 mm. long; disk corollas 3.5 mm. long; Ecuador. **10. D. antisanense.**
            Phyllaries acuminate, purplish at tip; pappus whitish, 5.5 mm. long; disk corollas 5 mm. long; Ecuador. **11. D. pycnophyllum.**

Involucre 9 to 14 mm. high.
Leaves glandular-pubescent above, not glandular-tuberculate or impressed-glandular; Peru---------- **2. D. meyenii.**
Leaves glandular-tuberculate or strongly impressed-glandular above.
Leaves glandular-tuberculate but not impressed-glandular above; Ecuador---------- **12. D. macrocephalum.**
Leaves strongly impressed-glandular above.
margin; Colombia, Ecuador---------- **13. D. spinulosum.**
Leaves 6 to 13 mm. long, spatulate-linear, tuberculate-spinulose toward
Leaves 12 to 22 mm. long.
Leaves linear-spatulate or linear, 12 to 19 mm. long, 1.3 to 2 mm. wide, whitish or ochroleucous-tomentose beneath; Colombia. **14. D. cicatricosum.**
Leaves oblanceolate or spatulate-oblanceolate, 15 to 22 mm. long, 2 to 4.5 mm. wide, sordid-lanate beneath; Ecuador. **15. D. oblanceolatum.**

2. Rosmarinifolia.

Leaves viscous-tomentellous or viscidulous above.
Heads subsessile; leaves not glabrescent above; involucre glabrous, its phyllaries lanceolate; Columbia---------- **16. D. cyparissias.**
Heads pedicellate; leaves glabrous or glabrescent above; involucre not glabrous, its phyllaries ovate to linear-oblong.
Leaves 2.7 to 4.2 cm. long; disk achenes glabrous; pappus rufidulous; Colombia---------- **17. D. rosmarinifolium.**
Leaves 1 to 2.5 cm. long; disk achenes sparsely hispid; pappus dull whitish; Colombia---------- **18. D. baccharideum.**
Leaves glabrous above, not viscid.
Leaves 9 to 15 mm. long; Colombia---------- **19. D. revolutum.**
Leaves 2.5 to 4.2 cm. long.
Leaves 1.5 to 2 (rarely 3) mm. wide; involucre 5 mm. high, its phyllaries oblong-lanceolate, glabrous or slightly ciliate and pubescent; achenes glabrous; Colombia---------- **17. D. rosmarinifolium.**
Leaves broader; heads thrice as large; phyllaries linear-acuminate, slightly woolly; achenes hispid; Peru---------- **20. D. carabayense.**

3. Rupestria.

Heads large, the involucre 10 to 12 mm. high.
Leaves linear-lanceolate, linear-spatulate, or elliptic-linear, sessile by a broad base, 3 to 7 mm. wide.
Heads pedicellate; leaves gray-tomentose beneath; Colombia, Ecuador. **21. D. rupestre.**
Heads sessile; leaves lutescent-tomentose beneath; Colombia. **22. D. weddellii.**
Leaves lanceolate to elliptic-ovate or oblong-lanceolate, 5 to 24 mm. wide, usually narrowed at base or petioled.
Leaves elliptic-ovate, 1.5 to 2.5 cm. long, 6 to 10 mm. wide, densely lanate-pilose beneath; Colombia---------- **23. D. eriophorum.**
Leaves lanceolate or elliptic to oblong-lanceolate, 2.5 to 10 cm. long, 5 to 24 mm. wide, densely ochraceous, ferrugineous, or griseous-tomentose beneath; Bolivia---------- **24. D. sejaense.**

Heads smaller, the involucre 4.5 to 9 mm. high.
Leaves glabrous or early glabrate above.
Leaves very thick-coriaceous, 5 to 11 mm. long, 1.5 to 3 mm. wide.
Pedicels 2 to 3 mm. long; ligules about 20; inner phyllaries nearly glabrous; Colombia (?)—— **25. D. phylicoides.**
Pedicels mostly 5 to 12 mm. long; ligules 8 to 13; phyllaries all tomentose at least at apex; Colombia—— **26. D. umbelliferum.**
Leaves thin-coriaceous or chartaceous, 1.5 to 6.5 cm. long, 4 to 15 mm. wide.
Leaves argenteous-tomentose beneath with closely appressed hairs; Peru. **27. D. lechleri.**
Leaves canescent, rufescent, or ochroleucous-tomentose beneath.
Leaves obovate-cuneate or oblanceolate; involucre 7 to 8 mm. high.
Rays 6 to 8; disk flowers about 20; Colombia. **28. D. rhododendroides.**
Rays about 27; disk flowers 7; Colombia—— **29. D. pleistogynum.**
Leaves lanceolate; involucre 4.5 mm. high; Colombia. **30. D. lehmannianum.**
Leaves cinereous-tomentellous above.
Leaves oblong, 5 to 11 mm. long; Colombia—— **26. D. umbelliferum.**
Leaves obovate-lanceolate to linear-oblanceolate, 2 to 3.5 cm.
Leaves oblanceolate or linear-oblanceolate, 2.5 to 4 cm. long, 1.5 to 6 mm. wide; heads about 57-flowered; Costa Rica— **31. D. costaricense.**
Leaves obovate-lanceolate or lanceolate, 5 to 8 mm. wide or more; heads fewer-flowered.
Leaves obovate-lanceolate, 2 cm. long, 5 to 8 mm. wide; heads 12 to 15-flowered; involucre 5 mm. high; Colombia—— **32 D. cochense.**
Leaves lanceolate, larger; heads larger, with more numerous flowers; Colombia —— **33. D. schultzii.**

4. Floribunda.

Heads large, the involucre about 10 mm. high; leaves 3 to 8 cm. long, 8 to 22 mm. wide; Peru—— **34. D. haenkei.**
Heads smaller, the involucre 5 to 7 mm. high; leaves smaller.
Leaves spatulate-oblanceolate or linear-oblanceolate, 1.5 to 6 mm. wide; Costa Rica—— **31. D. costaricense.**
Leaves obovate, elliptic, or oblong, 5 to 14 mm. wide.
Leaves rounded or emarginulate at apex, not apiculate; Venezuela. **35. D. obtusum.**
Leaves acute or obtusish, apiculate.
Leaves quickly glabrate or only slightly tomentellous above; Colombia. **36. D. floribundum.**
Leaves cinereous-tomentose above; Peru—— **37. D. incanum.**

5. Denticulata.

Involucre about 10 mm. high—— **24. D. sejaense.**
Involucre about 5 mm. high.
Leaves pergamentaceous, finely denticulate, prominulous-reticulate beneath.
Leaves lance-oblong, about 8.5 cm. long, 2.5 cm. wide; rays about 5; achenes glabrous; Ecuador?—— **38. D. ochraceum.**
Leaves elliptic-oblong or elliptic-obovate, 3.5 to 6 cm. long, 1.4 to 2.5 cm. wide; rays about 13; achenes pubescent; Colombia— **39. D. denticulatum.**
Leaves coriaceous, rather coarsely crenate-dentate or denticulate, with only the primary veins evident beneath; Colombia—— **40. D. bicolor.**

1. Diplostephium anactinotum Wedd. Chlor. And. 1: 201. *pl. 35, f. B.* 1857.

TYPE LOCALITY: Sierra Nevada of Santa Marta, Colombia, altitude 3,900 to 4,300 meters. Types collected by Funck (no. 390) and Schlim (no. 808).

SPECIMEN EXAMINED:

COLOMBIA (?): Without definite locality, 1842–43, *Funck & Schlim* 474 (G).

Readily distinguished by its depressed habit, very small and crowded, elliptic or obovate leaves, and short rays no longer than the disk. The flowers are whitish according to Funck, pale yellow according to Schlim. The specimen in the Gray Herbarium is labeled by Klatt as from Venezuela, but is doubtless from Colombia.

2. Diplostephium meyenii Wedd. Chlor. And. 1: 201. 1857.

Linochilus meyenii Schultz Bip.; Wedd. Chlor. And. 1: 201. 1857, as synonym.

? Aster (*?*) *trachyticus* F. Phil.; Phil. Anal. Mus. Nac. Chile Bot. **1891**: 37. 1891.

TYPE LOCALITY: Cordillera of Tacora, altitude 4,000 to 4,500 meters, Department of Tacna, Peru [now Chile?]. Type collected by Meyen.

To be distinguished, among the species with solitary heads, by its linear leaves 2 to 3 cm. long and glandular-pubescent on both sides, branches glandular-pubescent above, and linear-lanceolate, glandular-pubescent, apically ciliate phyllaries. The synonym of Philippi is added on the authority of Reiche.[3] Judging from the original description, the reference is open to doubt. Reiche records *D. meyenii* from the provinces of Tacna and Tarapacá, Chile.

3. Diplostephium tacorense Hieron. Bot. Jahrb. Engler **21**: 337. 1895.

TYPE LOCALITY: Plain near Tacora, Peru [now Chile?], altitude 4,000 to 4,500 meters. Type collected by Meyen.

SPECIMEN EXAMINED:

PERU: Below Pampa de Arrieros, 1914, *Rose* 18954 (N).

Closely related to *Diplostephium meyenii* Wedd., which comes from the same locality, and perhaps identical with that; the description of *D. meyenii* is not sufficiently detailed to decide the question in the absence of specimens.

4. Diplostephium adenachaenium Blake, sp. nov.

Shrub, densely leafy, much branched, 35 cm. high and more; stem densely lanate-tomentose with ochraceous or griseous hairs; leaves alternate; petioles broad but distinct from the blade, 1.5 mm. long; blades spreading or reflexed, elliptic or linear-oblong to spatulate-oblanceolate, 7 to 11 mm. long, 1.5 to 3 mm. wide, obtuse or acutish, callous-apiculate, at base rounded or cuneate-rounded, strongly coriaceous, entire, strongly revolute, above dark green, glabrous, smooth, somewhat shining, beneath densely and griseously lanate-tomentose, the costa impressed above, concealed beneath; heads solitary at tips of the numerous very short branchlets, about 2.7 cm. wide; disk subglobose, 8 to (fruit) 14 mm. high, 10 to (fruit) 15 mm. thick; involucre about 5-seriate, rather slightly graduated, 8 mm. high, the phyllaries lanceolate, acute (outer) to acuminate, densely pilose-tomentose on their exposed portions, not lacerate-ciliate, the innermost sometimes purplish-tinged at tip; rays about 18, purplish (?), sparsely hispidulous at base of limb, the tube 3 mm. long, the lamina linear-elliptic, 12 mm. long, 1.8 mm. wide; disk corollas numerous, purplish at tip, sparsely pilose toward base of throat, 7 mm. long (tube 2.5 mm., throat 3 mm.,

[3] Fl. Chil. **3**: 344. 1902.

teeth 1.5 mm.); achenes of ray and disk similar, densely stipitate-glandular, sometimes with a few short hairs above, 1.5 to 2 mm. long; pappus rufidulous tinged with purplish, the squamellae 1 to 1.3 mm. long, the awns 7 to 8 mm. long; style branches long, linear-subulate, hispidulous.

Type in the U. S. National Herbarium, no. 531,603, collected on the Páramo de Moras, between Mozoco and Pitayó, Tierra Adentro, State of Cauca, Colombia, altitude 3,000 to 3,500 meters, February, 1906, by H. Pittier (no. 1408).

Well distinguished by its chiefly linear-oblong, very thick, distinctly short-petioled leaves.

5. Diplostephium empetrifolium Blake, sp. nov. PLATE 21.

Undershrub, up to 27 cm. high or more, much branched; stem stout, denudate below, dull-tomentose, glabrescent; branches densely ochraceous-lanate-tomentose, densely leafy; leaves alternate; blades spreading or deflexed, linear, 2.5 to 5 mm. long, 0.8 to 1 mm. wide, acute or acutish, callous-mucronulate, sessile, thick-coriaceous, entire, revolute-margined, above green, densely impressed-glandular, glabrous or quickly glabrate, beneath densely ochraceous-lanate-tomentose, the costa often prominulous above, concealed beneath; heads solitary at tips of branches, short-peduncled, about 2 cm. wide; disk turbinate-hemispheric, 7 to 8 mm. high, 10 to (fruit) 15 mm. thick; involucre about 5-seriate, graduated, 7 to 8 mm. high, the phyllaries ovate (outer) to lanceolate or linear-lanceolate, acute to acuminate, the outer loosely arachnoid-pilose and lacerate-ciliate, the inner lacerate-ciliate, densely gland-dotted along midline, otherwise nearly glabrous, all whitish with strong costa; rays about 20, bluish (?), essentially glabrous, the tube 1.8 mm. long, the lamina linear-elliptic, 13 mm. long, 2.5 mm. wide; disk corollas numerous, whitish (?) or purplish, essentially glabrous except for the glandular teeth, 5.2 mm. long (tube 1.5 mm., throat 3 mm., teeth 0.7 mm.); achenes of ray and disk similar, hispidulous and densely gland-dotted, 1.3 to 2 mm. long; pappus rufidulous or strongly purplish, the outer bristles 1 mm. long, the inner 5.5 mm. long; style branches long, linear-subulate, hispidulous.

Type in the U. S. National Herbarium, no. 534,769, collected on the Páramo de Laragero, Province of Loxa, Ecuador, September, 1864, by W. Jameson. Duplicate in the herbarium of the New York Botanical Garden.

ADDITIONAL SPECIMENS EXAMINED:

ECUADOR: Between Cuenca and Loxa, altitude 3,660 meters, *Jameson* (G).
Vicinity of Tablón de Oña, 1918, *Rose, Pachano & Rose* 23100 (N, Y).
Loxa, *Seemann* (G).

PERU (?): Without definite locality, *Lobb* 197 (G).

This well-marked species is nearest *D. jelskii* Hieron., of Peru, which has leaves 7 to 8 mm. long and 2 mm. wide, sessile heads, and shorter rays (lamina 8 mm. long). Rose's plant differs from the other collections cited in its bright rosy-purple pappus and somewhat more strongly mucronulate leaves, but is not worthy of distinction.

EXPLANATION OF PLATE 21.—*Diplostephium empetrifolium*. Type specimen. Natural size.

6. Diplostephium jelskii Hieron. Bot. Jahrb. Engler **36**: 476. 1905.

TYPE LOCALITY: Near Cutervo, Peru. Type collected by Jelski (no. 622).

Apparently nearest *D. empetrifolium* Blake, but distinguished by its larger leaves. Hieronymus does not mention the impressed glands, which are so conspicuous in *D. emhpetrifolium;* if these are absent, the species can be separated by this character alone. Hieronymus describes the receptacle as provided with minute, obovate, obtuse, dentate-lacerate pales about 0.5 mm. long.

7. **Diplostephium parvifolium** Blake, nom. nov.

Diplostephium microphyllum Wedd. Chlor. And. **1**: 201. 1957. Not *D. microphyllum* Nees, 1832.

Linochilus microphyllus Schultz Bip.; Wedd. Chlor. And. **1**: 201. 1857, as synonym.

TYPE LOCALITY: Sierra Nevada of Santa Marta, altitude 3,000 meters, Colombia. Type collected by Funck (no. 388).

To be recognized by its small, acutish, lanceolate leaves (5 mm. long, 2 mm. wide), covered with a resinous layer above, its small heads (only 1 cm. wide in flower), and its short ligules (the lamina 3 mm. long, violet). By some error the locality is given by Weddell as "Venezuela: province de Caracas, dans la Sierra-Nevada de Santa Marta !, h. 3,000 m."

8. **Diplostephium lavandulifolium** H. B. K. Nov. Gen. & Sp. **4**: 97. *pl. 335*. 1820.

Diplopappus lavandulifolius Cass. Dict. Sci. Nat. **25**: 96. 1822.

Aster lavandulaceus Willd.; Nees, Gen. & Sp. Aster. 189. 1832, as synonym.

Linochilus lavandulifolius Schultz Bip.; Wedd. Chlor. And. **1**: 200. 1857, as synonym.

TYPE LOCALITY: Near Mulalo, altitude 2,930 meters, near the base of Mount Illinissa and Mount Cotopaxi, Ecuador.

ILLUSTRATION: Wedd. Chlor. And. **1**: *pl. 36, f. A*.

Distinguished by its linear or elliptic-linear leaves, 4 to 8 mm. long, 1 to 2.5 mm. wide, sparsely tomentellous above and densely appressed-white-tomentose beneath, and its lanate-tomentose phyllaries. Hieronymus records it from Mount Imbabura and Mount Cayambe, Ecuador, altitude 4,000 meters or more. Reiche [3] records the species from Ecuador, Bolivia, Peru, and the Province of Tacna, Chile, but this requires confirmation.

9. **Diplostephium hartwegii** Hieron. Bot. Jahrb. Engler **21**: 337. 1895.

TYPE LOCALITY: Saraguru Mountains, Ecuador. Type collected by Hartweg (no. 763).

SPECIMENS EXAMINED:

COLOMBIA: Province of Cauca, altitude 3,400 to 3,800 meters, *Lehmann* 4608 (Y).

ECUADOR: Mount Pichincha, altitude 3,660 to 4,575 meters, 1855, *Couthouy* (G, Y).

Closely related to *D. lavandulifolium* H. B. K., but distinguishable by its loosely cinereous or ferruginous-tomentose involucre and lower leaf-surface. Hieronymus records it also from Río Bobo, between Pasto and Laguna Grande de Cocha, Colombia. This species may prove to be the same as *D. lavandulifolium;* the type collection was originally referred to that species by Bentham,[4] with some hesitation, and by Weddell. Bentham states that two varieties, answering from his description to the two species as discriminated by Hieronymus, were included in Hartweg's no. 763.

10. **Diplostephium antisanense** Hieron. Bot. Jahrb. Engler **21**: 338. 1895.

TYPE LOCALITY: Near Las Cimarronas, Páramo of Mount Antisana, altitude 4,000 meters, Ecuador. Type collected by Stuebel (no. 235a).

Distinguished from *D. lavandulifolium* by its smaller heads and leaves (5 to 6 mm. long, 2 mm. wide); from *D. pycnophyllum* by the characters noted in the key.

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[3] Fl. Chil. **3**: 344. 1902.

[4] Pl. Hartw. 136. 1844.

11. Diplostephium pycnophyllum Blake, sp. nov.

Shrub, with many short branches; stem stout, densely tomentose with ochraceous hairs, becoming griseous; leaves alternate, very crowded; blades linear or elliptic-linear, 5 to 8 mm. long, 0.8 to 1.5 mm. wide, obtuse, callous-tipped but not mucronulate, sessile, coriaceous, entire, revolute-margined, above light green, glabrous, not at all glandular, beneath densely tomentose with ochraceous or cinereous hairs, the costa impressed above, concealed beneath; heads solitary at tips of the numerous short branchlets, sessile, about 1.5 cm. wide; disk subglobose, 6 to 7 mm. high, 6 to (fruit) 9 mm. thick; involucre about 4-seriate, slightly graduated, 4 to 5 mm. high, the outermost phyllaries lanceolate or linear, densely pilose-tomentose, the middle ones linear-lanceolate, acuminate, pilose-tomentose on their exposed portions, the innermost similar, purplish above, sparsely tomentose toward apex or essentially glabrous; rays about 20, pale (in the dried state), sparsely pubescent toward tip of tube, the tube 2.5 mm. long, the lamina linear-elliptic, 7 mm. long, 1.2 mm. wide; disk flowers about 16, apparently whitish, sparsely pubescent near the base of throat, 5 mm. long (tube 1.5 mm., throat 2.8 mm., teeth 0.7 mm.); achenes of ray and disk (immature) similar, hispidulous, sparsely glandular above, 1.2 to 1.7 mm. long; pappus dull whitish, the outer bristles 1 mm. long, the inner 5.5 mm. long; style branches elongate, linear-subulate, papillose, scarcely hispidulous.

Type in the U. S. National Herbarium, no. 1,023,325, collected on a páramo in the vicinity of Cañar, Ecuador, September 16, 1918, by J. N. Rose and G. Rose (no. 22750). Duplicate in the herbarium of the New York Botanical Garden.

Of the *D. lavandulifolium* group, allied to *D. antisanense* Hieron., which has merely acute greenish phyllaries, reddish or violascent pappus only 3.5 mm. long, smaller disk corollas (3.5 mm. long), and shorter rays (lamina 4.5 mm. long).

12. Diplostephium macrocephalum Blake, sp. nov. PLATE 22.

Shrub, with numerous short branchlets; stem stoutish, griseously pilose-tomentose; leaves alternate; blades oblanceolate or spatulate-oblanceolate, 8 to 13 mm. long, 1.5 to 3 mm. wide, obtuse, obscurely or not at all apiculate, sessile, strongly coriaceous, entire, revolute-margined, above dark green, sordidly pilose-tomentose, glabrescent, tuberculate especially toward margin, not impressed-grandular, beneath densely lanate-tomentose with ochraceous or griseous hairs, the costa impressed above, at length visible beneath; heads solitary at tips of branchlets, sessile, about 3 cm. wide; disk subglobose, about 13 mm. high and thick; involucre about 6-seriate, graduated, 12 to 14 mm. high, the outermost phyllaries ovate, acute, somewhat lanate-pilose, the inner lanceolate, acute or acuminate, glabrous except for the lacerate-ciliate margin; rays 30 or more, sparsely hispidulous toward base of limb, the tube 2 mm. long, the lamina linear-elliptic, 13 mm. long, 2 mm. wide; disk corollas numerous, whitish (?), sparsely hispidulous toward base of throat, glandular on teeth, 7 mm. long (tube 2.2 mm., throat 4 mm., teeth 0.8 mm.); achenes of ray and disk similar, hispid and gland-dotted, 2 mm. long; pappus purplish, the squamellae 0.8 to 1 mm. long, the bristles 7 to 8 mm. long; style branches elongate, linear-subulate, hispidulous.

Type in the U. S. National Herbarium, no. 1,023,357, collected in the vicinity of Nabón, Province of Azuay, between Cuenca and Loxa, Ecuador, September 25, 1918, by J. N. Rose, A. Pachano, and G. Rose (no. 22998).

Distinguished from related large-headed species of its group by having the leaves not impressed-glandular above.

EXPLANATION OF PLATE 22.—*Diplostephium macrocephalum*. Type specimen. Natural size.

13. Diplostephium spinulosum Wedd. Chlor. And. 1: 200. 1857.

? *Diplostephium glandulosum* Hieron. Bot. Jahrb. Engler 21: 339. 1895.

TYPE LOCALITY: Alpine pastures, Andes of Quito, altitude 4,200 meters, Ecuador. Type collected by Jameson (no. 406 of 1856).

SPECIMENS EXAMINED:

COLOMBIA: Mount Azufral, southern Cordillera, May 18, 1876, *André* (G).

ECUADOR: Cerro de Pillzhum, Province of Azuay, altitude 3,965 meters, *Jameson* (G).

Weddell's description of this species has been amplified by Hieronymus[1] on the basis of specimens collected by Sodiro near Riobamba, Ecuador. On comparing this with the original description of *D. glandulosum*, I am unable to find any differences which seem to be of specific value. The slight differences indicated by the two descriptions are broken down by the two specimens evidently referable to this species which I have examined. Hieronymus records his species from Colombia (*Stuebel* 445b, 253d, 284c) and Ecuador (*Stuebel* 272a, *Lehmann* 589).

14. Diplostephium cicatricosum Blake, sp. nov. PLATE 23.

Undershrub, several-stemmed, about 27 cm. high; stems stout, branched above the middle, densely covered with persistent leaf-bases 1 to 2 mm. long, at first densely lanate-tomentose with whitish hairs, glabrescent, densely leafy above; leaves alternate; blades linear or spatulate-linear, (8) 12 to 19 mm. long, 1.3 to 2 mm. wide, obtuse, callous-apiculate, sessile, revolute-margined, coriaceous, entire, above green, densely impressed-glandular, at first lanate-tomentose, soon glabrate, beneath whitish or ochraceous-tomentose, the costa impressed above, conspicuous beneath; heads solitary at tips of branchlets, about 1.8 cm. wide; disk turbinate-subglobose, 11 mm. high, 9 to 15 mm. thick; involucre about 6-seriate, graduated, 11 to 13 mm. high, the outermost phyllaries lance-ovate, acuminate, more or less pilose-tomentose and lacerate-ciliate, the inner lanceolate, acuminate, lacerate-ciliate, sparsely pilose-tomentose dorsally, all whitish; rays purplish (?), not well seen; disk corollas numerous, purplish, sparsely hispidulous at base of throat, 6.8 mm. long (tube 2.5 mm., throat 3.5 mm., teeth 0.8 mm.); disk achenes hispidulous and densely gland-dotted, 2.5 mm. long; pappus purplish, the squamellae 1 mm. long, the awns 6.5 mm. long; style branches elongate, linear-subulate, hispidulous.

Type in the U. S. National Herbarium, no. 531,325, collected on the Páramo de Buena Vista, Huila group, Central Cordillera, State of Cauca, Colombia, altitude 3,000 to 3,600 meters, January, 1906, by H. Pittier (no. 1128).

Characterized by its low stems, which are denuded of leaves for most of their length and covered by the persistent leaf bases.

EXPLANATION OF PLATE 23.—*Diplostephium cicatricosum*. Type specimen. Natural size.

15. Diplostephium oblanceolatum Blake, sp. nov. PLATE 24.

Shrub; stem stoutish, densely lanate-tomentose with matted brownish hairs; leaves alternate, often with short branchlets bearing reduced leaves in their axils; blades oblanceolate or spatulate-oblanceolate, the larger 15 to 22 mm. long, 3.5 to 4.5 mm. wide, obtuse, callous-mucronulate, gradually narrowed to the sessile base, strongly coriaceous, entire, somewhat revolute-margined, above green, densely impressed-glandular, sparsely tuberculate-setulose toward margin, at first lanate-tomentose, quickly glabrate, beneath densely ochraceous-lanate, the costa pale, evident above, concealed beneath; leaves of the branchlets

[1] Bot. Jahrb. Engler 29: 22. 1900.

similar, 7 to 10 mm. long; heads solitary on leafy branches crowded toward tip of stem, about 2.2 cm. wide; disk campanulate-subglobose, in fruit about 1.3 cm. high, 1.5 cm. thick; involucre about 5-seriate, graduated, 11 to 12 mm. high, the outermost phyllaries ovate, pilose-tomentose dorsally, the inner lanceolate, acute to acuminate, whitish, slightly lacerate on margin, glabrous or essentially so; rays 15 or more, purplish (?), the tube glabrous, 2 mm. long, the lamina narrowly elliptic, 11 mm. long, 2.5 mm. wide, tridenticulate, sparsely hispidulous at base; disk corollas numerous, purplish above, sparsely hispidulous toward base of throat, 6.5 mm. long (tube 1.8 mm., throat 3.6 mm., teeth 1.1 mm.); achenes of ray and disk similar, densely hispid-pilose, 1.8 to 2 mm. long; pappus rufidulous, the outer of about 20 linear or linear-lanceolate squamellae 0.7 to 1 mm. long, the inner of about 45 setae, about 7 mm. long; style branches elongate, linear-subulate, hispidulous.

Type in the Gray Herbarium, collected at Chuquiribamba, Ecuador, altitude 3,000 meters, November, 1876, by Édouard André (no. 1). Photograph and fragments in the U. S. National Herbarium.

Related to *D. cicatricosum* Blake, which has narrower linear or linear-spatulate leaves only 1.3 to 2 mm. wide, less densely lanate stems, and rather densely lacerate-ciliate phyllaries. The type was distributed as *Diplostephium mandoni*, a very different species with corymbose-panicled heads.

EXPLANATION OF PLATE 24.—*Diplostephium oblanceolatum*. Type specimen. Natural size.

16. Diplostephium cyparissias Wedd. Chlor. And. 1: 203. 1857.

TYPE LOCALITY: Sierra Nevada of Santa Marta, Colombia, altitude 3,000 meters. Type collected by Funck (no. 387).

Distinguished among the species of its group by its leaves, which are viscous-tomentellous above and yellowish or whitish-tomentose beneath, its subsessile heads, and glabrous involucre. As in the case of *D. parvifolium*, the habitat of this species is erroneously given by Weddell as Venezuela, Province of Caracas, Sierra Nevada of Santa Marta.

17. Diplostephium rosmarinifolium (Benth.) Wedd. Chlor. And. 1: 202. 1857.

Linochilus rosmarinifolius Benth. Pl. Hartw. 197. 1845.

TYPE LOCALITY: Near Bogotá, Colombia.

SPECIMEN EXAMINED:

COLOMBIA: Near Bogotá, *Hartweg* 1092 (type collection; Y, photo and fragm. N).

Closely related to *D. baccharideum*, but distinguished by its much longer leaves, which are rather densely dotted above with sessile glands. The genus *Linochilus* of Bentham was based on this species and placed in the Mutisieae, the anthers being described as very shortly bisetose at base, and the ligules as bilabiate. Examination of the type number shows that the anthers are merely minutely sagittate at base, and that the ligules are not truly bilabiate, but bear inside the tube a couple of exserted linear appendages which probably represent abortive stamens.

18. Diplostephium baccharideum Blake, sp. nov. PLATE 25.

Shrub; stem branched, denudate below, tuberculate with the prominent leaf scars, densely cinereous-tomentose, glabrescent; leaves alternate; blades linear, 10 to 25 mm. long, 1 to 2 mm. wide, acutish, callous-apiculate, sessile, coriaceous, entire, revolute-margined, spreading, above deep green, quickly glabrate, more or less lepidote-glandular, beneath densely ochraceous or cinereous-tomentose, the costa prominulous or impressed above, concealed beneath; heads about 1 cm. wide, in dense cymose panicles 2 to 3.5 cm. wide at tips of branches,

on ochraceous-tomentose pedicels 3 to 7 mm. long; disk 7 mm. high, 5 to (fruit) 8 mm. wide; involucre about 5-seriate, graduated, 5 to 6 mm. high, the outermost phyllaries ovate, obtuse, cinereous-tomentose chiefly along midline, the inner oblong-ovate to linear-oblong, obtuse, ciliolate, somewhat viscid, sparsely tomentose on midline near apex or the innermost nearly glabrous, the costa greenish or sometimes purplish toward apex; rays about 11, the tube pubescent, 3 mm. long, the lamina linear-elliptic, 2.5 mm. long; disk flowers about 10, the corollas glandular-pubescent on throat, 4.8 mm. long (tube 2.2 mm. long, throat 1 mm. long, teeth 1.6 mm. long); ray achenes essentially glabrous, 1.5 mm. long; disk achenes sparsely hispid, 2 to 2.7 mm. long; pappus dull whitish, the outer bristles 0.8 to 1 mm. long, the inner 4 mm. long; style branches very short, elliptic-ovate, papillose.

Type in the U. S. National Herbarium, no. 888,707, collected at Montserrate, vicinity of Bogotá, Colombia, 1917, by Brother Ariste-Joseph (no. B34).

ADDITIONAL SPECIMENS EXAMINED:

COLOMBIA: Moist cañon above Chapinero, Department of Cundinamarca, altitude 2,800 to 2,900 meters, September, 1917, *Pennell* 2008 (N, Y). Bogotá, 1914, *Ariste-Joseph* A50(N). Without definite locality, *Triana* 4(G); *Funk & Schlim* 1286(G); Ariste-Joseph A48(N). Shrub zone, below Parama de Chaquiro, Department of Bolívar, altitude 2,900 to 3,100 meters, February, 1918, *Pennell* 4336 (Y).

The specimens of Triana and of Funck and Schlim in the Gray Herbarium are fragments in the Klatt collection of Compositae, where both were labeled *Diplostephium rosmarinifolium*. The Funck and Schlim sheet was labeled Venezuela, but is doubtless from Colombia. Weddell cites Funck and Schlim 1289, from Colombia (to which collection the Klatt specimen may really appertain), under *D. rosmarinifolium*. *D. rosmarinifolium*, of which I have examined a specimen of the type collection in the herbarium of the New York Botanical Garden, is closely related, but has leaves 2.7 to 4.2 cm. long, glabrous achenes, and rufidulous pappus. The var. β with shorter leaves, mentioned by Weddell, may be the same as the new species here described.

EXPLANATION OF PLATE 25.—*Diplostephium baccharideum*. Type specimen. Natural size.

19. Diplostephium revolutum Blake, sp. nov.

Low shrub, 25 cm. high or more; stem stout, much branched above, glabrescent, tuberculate with the prominent leaf scars; branchlets somewhat viscid, essentially glabrous, angled, densely leafy; leaves alternate; blades linear or slightly spatulate-linear, 9 to 15 mm. long, 1 to 2.3 mm. wide, acute or acutish, callous-tipped but scarcely apiculate, sessile, coriaceous, entire, strongly revolute, above deep green, glabrous, obscurely punctate, beneath ochraceous or cinereous-tomentose with closely felted hairs, the costa usually impressed above, evident beneath; heads small, about 8 mm. wide, in dense cymose panicles 1 to 2 cm. wide at tips of branches; pedicels nearly glabrous, 1 to 6 mm. long; disk 4 to (fruit) 6 mm. high, 3 to (fruit) 8 mm. thick; involucre about 4-seriate, graduated, 4 to 5.5 mm. high, the outermost phyllaries ovate, acute, ciliolate, somewhat tomentose, the inner lanceolate to linear-lanceolate, acute, arachnoid-ciliolate, somewhat viscid, purplish-tinged toward tip, all whitish and subcoriaceous, with obscure costa; rays about 11, whitish (in the dried state), the tube puberulous with several-celled hairs, 2.5 mm. long, the lamina linear, 3 mm. long. 0.5 mm. wide; disk corollas about 11, whitish (when dry), pubescent on the throat with several-celled hairs, 4.7 mm. long (tube 1.5 mm., throat 1.5 mm., not thicker than the tube, teeth ovate-lanceolate, 1.7 mm.);

ray achenes sparsely glandular, 1.2 mm. long; disk achenes glandular and very sparsely hispidulous, 2 mm. long; pappus dull whitish, the outer bristles 1 to 1.5 mm. long, the inner 4 mm. long; style branches very short, elliptic-ovate, papillose.

Type in the U. S. National Herbarium, no. 888,441, collected at Bogotá, Colombia, 1917, by Brother Ariste-Joseph (no. A233).

ADDITIONAL SPECIMENS EXAMINED:

COLOMBIA: Laguna de Verjón, vicinity of Bogotá, October, 1917, *Ariste-Joseph* A78(N).

Allied to *D. rosmarinifolium* (Benth.) Wedd., which has the branches tomentose, at least when young, and leaves 27 to 42 mm. long.

20. Diplostephium carabayense Wedd. Chlor. And. **1**: 202. 1857.

TYPE LOCALITY: Alpine region, above San Juan del Oro, Province of Carabaya, Peru. Type collected by Weddell.

Said to be near *D. rosmarinifolium*, but with somewhat broader leaves, heads thrice as large (2 cm. wide in flower), linear acuminate phyllaries slightly woolly outside, and hispid achenes.

21. Diplostephium rupestre (H. B. K.) Wedd. Chlor. And. **1**: 206. 1857.

Aster rupestris H. B. K. Nov. Gen. & Sp. **4**: 94. *pl. 334*. 1820.

Tetramolopium ? rupestre Nees, Gen. & Sp. Aster 202. 1832.

Aster pichinchensis Willd.; Nees, Gen. & Sp. Aster. 203. 1832, as synonym.

TYPE LOCALITY: Mount Pichincha and Mount Antisana, altitude 3,300 meters, Ecuador.

SPECIMENS EXAMINED:

COLOMBIA: Páramo de Ruiz, Department of Tolima, altitude 3,800 to 4,300 meters, 1917, *Pennell* 3036 (N, Y); in 1918, altitude 3,000 to 3,500 meters, *Dawe* 762 (Y). Without definite locality, *Triana* 89 (G).

ECUADOR: Mount Pichincha, altitude 4,115 to 4,575 meters, 1855, *Couthouy* (G, Y). Summit of Mount Pichincha, *Jameson* 13 (G).

22. Diplostephium weddellii Blake, nom. nov.

Diplostephium sessiliflorum Wedd. Chlor. And. **1**: 204. 1857. Not *D. sessiliflorum* Spreng. 1826.

TYPE LOCALITY: Sierra Nevada, altitude 3,800 to 4,300 meters, Province of Río Hacha, Colombia. Type collected by Schlim (no. 806).

Distinguished from its closest ally, *D. rupestre*, by its sessile heads and by its leaves, which are glabrous and shining above and densely lutescent-tomentose beneath. In *D. rupestre* the leaves are usually dull and with some persistent hairs above, and cinereous or in old specimens sometimes slightly yellowish-tomentose beneath. According to Schlim, the flowers of *D. weddellii* are yellow, but it is probable that this statement has reference only to the color of the disk.

23. Diplostephium eriophorum Wedd. Chlor. And. **1**: 206. *pl. 36, f. C*. 1857.

TYPE LOCALITY: Mount Tolima, near the limit of perpetual snow, Colombia.

SPECIMENS EXAMINED:

COLOMBIA: Mount Tolima, *Goudot* (type collection; G). Dry open ground. Páramo de Ruiz, Department of Tolima, altitude 3,800 to 4,300 meters, 1917, *Pennell* 3029 (N, Y).

In this species the branchlets are glabrate and denudate below, at apex very densely leafy and densely long-lanate. The flowers, according to Pennell's label, are white. The pappus is comparatively sparse, and the bristles, although very unequal, are sometimes in essentially a single series.

24. Diplostephium sejaense (Kuntze) Blake.

Aster sejaensis Kuntze, Rev. Gen. Pl. **3**[2]: 131. 1898.

Diplostephium mandoni Rusby, Bull. N. Y. Bot. Gard. **4**: 383. 1907.

Diplostephium liabioides Rusby, Bull. N. Y. Bot. Gard. **4**: 384. 1907.

Diplostephium atropurpureum Rusby, Bull. N. Y. Bot. Gard. **4**: 384. 1907.

TYPE LOCALITY: Near La Seja, altitude 300 meters, between Cochabamba and Santa Rosa, Bolivia.

SPECIMENS EXAMINED:

BOLIVIA: Near Sorata, foot of Mount Illampu, Province Larecaja, March, 1858, *Mandon* 215 (type collection of D. *mandoni;* G, Y, photo. and fragm. N). Unduavi, altitude 2,440 meters, 1885, *Rusby* 1660 (Y); in 1894, *Bang* 2496 (type of D. *liabioides;* Y, photo. N); in 1910, *Buchtien* 3030 (N, Y), 3031 (Y); in 1914, altitude 3,200 meters, *Buchtien* 478 (Y). La Seja, April, 1892, *Kuntze* (types; N, Y). Without definite locality, *Bang* 2030 (type of *D. atropurpureum;* Y, photo. and fragm. N); *Bang* 2895 (Y).

The leaves in this species are narrowly elliptic to lance-elliptic, 2.5 to 10 cm. long, 0.5 to 2.4 cm. wide, green and glabrous above (except for the base of the costa), beneath densely ochroleucous or cinereous-tomentose, with the veins concealed or very obscure. *D. liabioides* was separated chiefly on the strength of its irregularly toothed leaves, and *D. atropurpureum* on the basis of several supposed differences of no real consequence. As to the toothing of the leaves, all the specimens which bear toothed leaves bear also entire ones, and I find one or two toothed leaves in the type number of *D. mandoni.* In the type of *D. atropurpureum* the receptacle, as noted by Rusby, bears toward the center a number of linear-subulate attenuate pales about 1.5 mm. long. These are shown by some but not all of the other collections examined. Both Kuntze and Rusby describe the ray and disk flowers as purplish (or "blue"). In some specimens of this and other species dissected I have found purplish disk flowers in the same head with obviously less mature whitish ones. It is evident that in this genus, as in many other Astereae, the disk flowers are often, if not always, white at first, becoming purplish in age.

The first name applied to this species was "*Diplostephium mandonii* Schultz Bip."[6] This has been used in several occasions, but was first provided with description by Rusby in 1907, some years after the publication of *Aster sejaensis* by Kuntze. It may be noted that Rusby's reference of *Mandon* 219 to *D. mandoni* and *Mandon* 215 to *D. atropurpureum* is based upon an error in the labels, as the only *Diplostephium* distributed by Mandon was his no. 215.

25. Diplostephium phylicoides (H. B. K.) Wedd. Chlor. And. **1**: 205. 1857.

Aster phylicoides H. B. K. Nov. Gen. & Sp. **4**: 93. 1820.

Tetramolopium ? phylicoides DC. Prodr. **5**: 262. 1836.

Linochilus phylicoides Schultz Bip.; Wedd. Chlor. And. **1**: 205. 1857, as synonym.

TYPE LOCALITY: "Nova Hispania?" (Colombia ?, according to Weddell).

Related to *D. umbelliferum* Blake, but distinguished by its very short pedicels, more numerous rays, and nearly glabrous involucre.

26. Diplostephium umbelliferum Blake, sp. nov. PLATE 26.

Shrub, 25 cm. high or more; stem stout, branched above, denudate below, ochraceous or fuscescent-tomentose, glabrescent below, tuberculate with the conspicuous leaf scars; leaves alternate, spreading or reflexed; blades linear-

[6] Linnaea **34**: 534. 1865–66.

oblong or narrowly elliptic-oblong, 5 to 11 mm. long, 1.8 to 3 mm .wide, obtuse or acutish, usually callous-apiculate, rounded at the sessile base, thick, strongly coriaceous, entire, revolute-margined, above deep green, quickly glabrate, obscurely viscidulous, smooth, not impressed-glandular, beneath densely ochraceous, brownish, or fuscescent-tomentose, the costa above usually prominulous toward base, evanescent toward tip, concealed beneath; heads about 1.2 cm. wide, several or numerous in umbelliform cymes 2 to 3.5 cm. wide at tips of branches; pedicels densely tomentose, 3 to 12 mm. long; disk 7 to 9 mm. high, 5 to (fruit) 10 mm. thick; involucre about 5-seriate, graduated, 6 mm. high, the outermost phyllaries ovate, acutish, densely arachnoid-tomentose, the inner lanceolate to linear-lanceolate, acute or acutish, densely or rarely sparsely arachnoid-tomentose toward tip, arachnoid-ciliate, more or less glandular, all firm and purplish or black-purplish on margin and toward tip; rays 8 to 13, "purple blue," sparsely puberulous at apex of tube, the tube 4 mm. long, the lamina linear-elliptic, 5 mm. long, 1.5 mm. wide; disk flowers 6 to 10, their corollas whitish (when dry) or purplish in age, puberulous on throat, 6 mm. long (tube 2 mm., throat 1.6 mm., not thicker than the tube, teeth 2.4 mm.); achenes sparsely glandular, 1.5 to 2.5 mm. long; pappus whitish or ferruginous, the outer bristles few, about 1 mm. long, the inner 4.5 to 5 mm. long; style branches of medium length, linear, acute, papillose-hispidulous.

Type in the U. S. National Herbarium, no. 888,756, collected at Guadalupe, near Bogotá, Colombia, 1917, by Brother Ariste-Joseph (no. A77).

ADDITIONAL SPECIMENS EXAMINED:

COLOMBIA: Montserrate, near Bogotá, 1852, *Holton* 326 (G, Y); in 1909, *Ariste-Joseph* A35(N). Quebrada de la Vieja, near Bogotá, 1909, *Ariste-Joseph* A34(N). Bushy slope, Mount Guadalupe, above Bogotá, alt. 2,800 to 3,000 meters, 1917, *Pennell* 1916 (Y). Without definite locality, *Triana* 1956(Y).

This species is nearest *D. phylicoides* (H. B. K.) Wedd., which has shorter pedicels (2 to 3 mm. long), more numerous ligules (about 20), and nearly glabrous inner phyllaries. In *D. phylicoides*, moreover, the style of the disk flowers is described by Weddell as clavate and subentire.

EXPLANATION OF PLATE 26.—*Diplostephium umbelliferum*. Type specimen. Natural size.

27. Diplostephium lechleri (Schultz Bip.) Wedd. Chlor. And. **1**: 204. 1857.

Liabum (*Oligactis*) *lechleri* Schultz Bip. Bonplandia **3**: 236. 1855.

TYPE LOCALITY: Near Sachapata, Province of Carabaya, Andes of Peru.

SPECIMEN EXAMINED:

PERU: Near Sachapata, Province of Carabaya, August, 1854, *Lechler* 2517 (type collection; G).

This species is well distinguished by its leaves. These are elliptic or elliptic-lanceolate, acutish, at base acute, 2.6 to 6.5 cm. long, 5 to 15 mm. wide, slightly revolute-margined, rather thin-coriaceous, above brownish-green, shining and glabrous except for the puberulous costa, beneath argenteous-tomentose with a very closely appressed tomentum. The lateral veins are about 13 pairs in the larger leaves, like the costa impressed above, obscure or evident but scarcely prominulous beneath. The involucre is 8 to 9 mm. high, of lanceolate to linear-lanceolate acute phyllaries, the outer appressed-tomentose, the inner dark brown and glabrous, with lacerate-ciliate tips.

28. Diplostephium rhododendroides Hieron. Bot. Jahrb. Engler **21**: 340. 1895.

TYPE LOCALITY: Laguna Verde, near Azufral de Tuqueres, Colombia. Type collected by Stuebel (no. 429).

Distinguished from *D. lechleri* by its obovate-cuneate leaves (2.5 cm. long, 1 cm. wide), densely reddish or rufescent-tomentellous beneath; from *D. lehmannianum* by its larger heads; and from *D. pleistogynum* by the characters noted in the key.

29. Diplostephium pleistogynum Blake, sp. nov.

Shrub; stem stoutish, branched, ochraceous-tomentose on the younger parts, glabrescent and denudate below, marked with the decurrent leaf scars; leaves alternate, crowded; blades oblanceolate, the larger 13 to 27 mm. long, 4 to 7 mm. wide, acute, callous-apiculate, narrowed to a sessile base, rather thin-coriaceous, entire, the margin scarcely revolute, above deep green, shining, glabrous or obscurely tomentulose along costa, beneath densely canescent-tomentose, at first ochraceous-tinged; heads about 10 in a dense terminal cyme 3.5 cm. wide; pedicels densely tomentose, 5 to 10 mm. long; disk 8 mm. high, 5 to 7 mm. thick; involucre about 5-seriate, graduated, 7 to 8 mm. high, the outer phyllaries ovate, acute, densely tomentose, the inner lanceolate to linear-lanceolate, acuminate, densely pilose-tomentose except on margin, the extreme tips glabrescent, purplish-tinged; rays 27, pale (when dried), the tube sparsely puberulous, 2 mm. long, the lamina linear, 2-toothed, 4 mm. long; disk flowers about 7, their corollas glandular-puberulous toward base of throat, 4.8 mm. long (tube 1.5 mm., throat slightly broader, 1.5 mm., teeth elongated-triangular, 1.8 mm.); achenes (immature) glandular and hispidulous, 1.3 mm. long; pappus purplish-tinged, the outer bristles few, 0.8 to 1.5 mm. long, the inner 5 to 6 mm. long; style branches very short, rounded, papillose.

Type in the U. S. National Herbarium, no. 531,758, collected on the Páramo de Buena Vista, Huila Group, Central Cordillera, Colombia, altitude 3,000 to 3,600 meters, January, 1906, by H. Pittier.

This species is apparently nearest *D. rhododendroides* Hieron., but is easily distinguished by the difference in the number of the flowers. In *D. rhododendroides* the heads are described as having 25 to 30 flowers, only 6 to 8 of which are ligulate.

30. Diplostephium lehmannianum Hieron. Bot. Jahrb. Engler **21**: 340. 1895.

Diplostephium schultzii var. *lehmanniana* Hieron. Bot. Jahrb. Engler **19**: 48. 1894.

TYPE LOCALITY: Páramo de Guanacas, Province of Popayán, Colombia, altitude 3,000 to 3,500 meters. Type collected by Lehmann (no. 4893).

Diplostephium lehmannianum has leaves 1.5 cm. long, 5 to 6 mm. wide, glabrous above and densely canescent-tomentellous or reddish-tomentose beneath, heads 5 mm. high, minutely glandular achenes, and purplish pappus.

31. Diplostephium costaricense Blake, sp. nov. PLATE 27.

Branching shrub; stem stoutish, denudate below, marked with decurrent leaf scars, ochraceous- or cinereous-tomentose, glabrescent or glabrate below; leaves alternate, crowded; blades oblanceolate or linear-oblanceolate, 2.5 to 4 cm. long, 1.5 to 6 mm. wide, acutish, callous-apiculate, narrowed to a sessile base, rather thin-coriaceous, entire, strongly revolute-margined, above cinerous- or ochraceous-tomentulose, in age sometimes glabrescent, beneath densely ochraceous- or cinereous-tomentose, the costa impressed above, evident beneath, the lateral veins concealed or sometimes evident beneath; heads 9 to 13 mm. wide, numerous in dense terminal cymose panicles 3 to 5 cm. wide; pedicels densely tomentose, 3 to 10 mm. long; disk campanulate-hemispheric, 6 to (fruit) 9 mm. high, 7 to (fruit) 12 mm. thick; involucre about 5-seriate, graduated, 5 to 7 mm. high, the phyllaries ovate or lance-ovate (outer) to lanceolate or linear-lanceolate, acutish to acuminate, densely cinereous-tomentose on their exposed por-

tions, indurated, brownish white, with obscure costa, the inner purplish-tinged toward apex; rays about 21, pale (when dried), the tube and base of limb puberulous with glanduliform hairs, the tube 3 to 3.5 mm. long, the lamina linear, 4 mm. long, 0.8 mm. wide; disk flowers about 36, the corollas purplish above, glandular on throat, glandular and sparsely hispid-pilose toward tip of teeth, 5.8 mm. long (tube 2.5 mm., throat 1.5 mm., funnelform-campanulate, teeth 1.8 mm.); achenes of ray and disk similar, densely glandular, 1.5 to 2.5 mm. long; pappus ferruginous-purplish, the outer bristles 0.6 to 1.5 mm. long, the inner 5.5 mm. long; style branches very short, ovate, obtuse, papillose.

Type in the U. S. National Herbarium, no. 939,625, collected on the Cerro de la Muerta, Costa Rica, altitude 3,100 meters, January, 1897, by H. Pittier (no. 10459).

ADDITIONAL SPECIMEN EXAMINED:

COSTA RICA: Humid woods, La Palma, altitude 1,500 meters, December, 1888, *Pittier* 681(N).

Apparently nearest to the Colombian *D. cochense* Hieron., which is said to have obovate-lanceolate leaves, 2 cm. long and 7 to 8 mm. wide, and 12 to 15-flowered heads. Greenman's record[1] of *Diplostephium schultzii* from Costa Rica, based on *Pittier* 178, from Mount Irazú, and *Pittier* 14072, doubtless refers to *D. costaricense.*

EXPLANATION OF PLATE 27.—*Diplostephium costaricense.* Specimen of type collection (U. S. Nat. Herb. no. 471,988).

32. Diplostephium cochense Hieron. Bot. Jahrb. Engler **21**: 341. 1895.

TYPE LOCALITY: Plain near Río Cocha, Colombia. Type collected by Stuebel (no. 353).

SPECIMEN EXAMINED:

COLOMBIA: Without definite locality, *Triana* 90(G).

This species is closely related to *D. schultzii,* and may not be distinct. The description of that species is incomplete, and the only material available is very fragmentary. The specimen in the Gray Herbarium that I have referred to *D. cochense* seems to agree better with this species than with *D. schultzii,* but the reference is uncertain.

33. Diplostephium schultzii Wedd. Chlor. And. **1**: 204. 1857.

Linochilus jodopappus Schultz Bip.; Wedd. Chlor. And. **1**: 204. 1857, as synonym.

TYPE LOCALITY: Volcán Tolima, Province of Mariquita, Colombia, altitude above 4,000 meters.

SPECIMEN EXAMINED:

COLOMBIA: Volcán Tolima, *Linden* 901 (type collection; fragments, G).

The description of this species is lacking in details enabling it to be distinguished satisfactorily from *D. cochense* Hieron.

34. Diplostephium haenkei (DC.) Wedd. Chlor. And. **1**: 203. 1857.

Simblocline haenkei DC. Prodr. **5**: 297. 1836.

TYPE LOCALITY: Peru. Type collected by Haenke.

Distinguished in its group by its comparatively large heads and leaves. Weddell refers to this species specimens from Cuzco, Peru (*Gay*), and Cochabamba, Bolivia (*D'Orbigny* 1123). He mentions also a variety with leaves unequally serrate. His description of the species is suggestive of *Diplostephium sejaense,* but in that the leaves are not reticulate beneath. It is probable that his Bolivian record of the species relates to *D. sejaense.*

[1] Proc. Amer. Acad. **40**: 36. 1904.

35. Diplostephium obtusum Blake, sp. nov.

Shrub, branched above; stem stoutish, marked with the persistent leaf scars, ochraceous- or cinereous-tomentose, denudate and glabrescent below, the young branches angled; leaves alternate, rather crowded; petioles tomentulose, 3 to 8 mm. long (including the narrowly margined upper portion); blades obovate or elliptic-obovate, 2 to 3.8 cm. long, 6 to 13 mm. wide, rounded or obtuse, usually emarginate, not apiculate, acutely decurrent into the petiole, rather thin-coriaceous, entire, slightly or strongly revolute-margined, above green, arachnoid-tomentulose, in age glabrescent or glabrate, beneath densely ochraceous-tomentose, the costa and the 9 to 13 pairs of lateral veins (spreading essentially at right angles) impressed above, evident beneath; heads (overmature) rather small, 3 to 6 in a terminal cyme 1.5 to 2.8 cm. wide; pedicels densely tomentose, in fruit 6 to 20 mm. long; involucre about 5-seriate, graduated, 5 mm. high, the outer phyllaries ovate, obtuse, densely cinereous-tomentose at least along midline, the inner ovate-lanceolate to narrowly oblong-lanceolate, obtuse to acute, tomentulose and somewhat ciliolate toward tip or glabrescent, somewhat viscidulous along back, all thick, whitish, without evident costa; heads 18 to 21-flowered; rays not seen; disk corollas puberulous on throat, about 4 mm. long (tube 1.4 to 2.2 mm., throat slightly widened above, 1.5 mm., teeth 0.8 to 1 mm.); ray achenes essentially glabrous, 2 mm. long; disk achenes sparsely hispidulous, 2.8 to 3 mm. long; pappus rufidulous, the outer pappus (bristle-form in the ray, more squamellate in the disk) about 1 mm. long, the inner 3.5 mm. long.

Type in the U. S. National Herbarium, no. 602,219, collected on the Páramo del Jabón, State of Trujillo, Venezuela, altitude 3,000 to 3,200 meters, October 2, 1910, by Alfredo Jahn (no. 24a).

ADDITIONAL SPECIMEN EXAMINED:

VENEZUELA: Páramo de las Rosas, State of Trujillo, altitude 2,800 meters, October 1, 1910, *Jahn* 24.

Allied to *D. incanum* Hieron., of Peru, which is described as having oblong, obtusish, apiculate leaves 4 to 4.5 cm. long, short outer pappus (only 0.3 mm. long), and much broader inner phyllaries (2.5 to 3 mm. wide).

36. Diplostephium floribundum (Benth.) Wedd. Chlor. And. 1: 205. *pl. 36, f. B.* 1857.

Linochilus floribundus Benth. Pl. Hartw. 203. 1845.

Linochilus ochraceus Schultz Bip.; Wedd. Chlor. And. 1: 205. 1857, as synonym.

Diplostephium ochroleucum Klatt, Bot. Jahrb. Engler 8: 37. 1886.

Aster ochroleucus Kuntze, Rev. Gen. Pl. 3²: 131. 1898.

TYPE LOCALITY: Near Tambo de Gabriel López, Páramo de Guanacas, Province of Popayán, Colombia.

SPECIMENS EXAMINED:

COLOMBIA: Near Tambo de Gabriel López, Páramo de Guanacas, *Hartweg* 1126 (type collection; Y, photo. N). High swampy plain of Paletará, Province of Cauca, altitude 3,000 meters, May 2, 1884, *Lehmann* 3579 (type of *D. ochroleucum;* G, photo. and fragm. N). Páramo de Buena Vista, Huila Group, Central Cordillera, Department of Cauca, altitude 3,000 to 3,600 meters, 1906, *Pittier* 1174 (N).

Distinguished from *D. haenkei* by its small heads and leaves, and from *D. obtusum* by its apiculate leaves. Lehmann's specimens differ from the type collection of *D. floribundum* only in having the leaves ochroleucous instead of rufidulous beneath, and this difference is shown by other species to be not of specific importance.

37. Diplostephium incanum Hieron. Bot. Jahrb. Engler **21**: 340. 1895.

TYPE LOCALITY: Near Pishen-uñuna, between Pacasmayo and Moyobamba, altitude 3,200 meters, Peru. Type collected by Stuebel (no. 32a).

This species has oblong leaves (4 to 4.5 cm. long, 13 to 14 mm. wide), obtusish at each end, mucronate-apiculate, cinereous-tomentose above and densely rufescent-cinereous-tomentose beneath.

38. Diplostephium ochraceum (H. B. K.) Nees, Gen. & Sp. Aster. 201. 1832.

Aster ochraceus H. B. K. Nov. Gen. & Sp. **4**: 94. 1820.

Tetramolopium ? ochraceum DC. Prodr. **5**: 262. 1836.

TYPE LOCALITY: "In montibus Quitensibus?"

Distinguished from its allies by the characters indicated in the key.

39. Diplostephium denticulatum Blake, Contr. Gray Herb. n. ser. **53**: 25. 1918.

TYPE LOCALITY: Guadalupe, Colombia, altitude 3,000 meters.

SPECIMENS EXAMINED:

COLOMBIA: Guadalupe, altitude 3,000 meters, July, 1911, *Apollinaire & Arthur* 11 (type collection; N).

Apparently closely related to *D. ochraceum*, but distinguished by its smaller leaves, more numerous rays, and pubescent achenes.

40. Diplostephium bicolor Blake, sp. nov. PLATE 28.

"Small tree, 2 to 4 meters high"; stem stout, with conspicuous leaf scars, densely ochraceous-tomentose, in age cinereous-tomentose; branchlets angled; leaves alternate, comparatively remote (3 to 6 mm. apart); petioles densely tomentose, 7 to 12 mm. long; blades obovate or oblong-obovate, 4.5 to 8 cm. long, 1.7 to 3 cm. wide, acutish or obtuse, apiculate, at base acutely cuneate, coriaceous, crenate-dentate or denticulate above the entire base with 6 to 12 pairs of low mucronulate teeth, not revolute-margined, above deep green, at first ochraceous-tomentose, quickly glabrate and deep green, smooth, beneath densely ochraceous-tomentose with soft rather loose hairs, the costa impressed above, evident beneath, the 7 to 12 pairs of lateral veins spreading at an angle of about 60°, impressed or obscure above, evident beneath through the tomentum, the secondaries somewhat foveolate-reticulate above, concealed beneath; heads turbinate-campanulate, becoming hemispheric, 8 mm. wide, several or numerous in terminal and subterminal cymose panicles 2.2 to 3.2 cm. wide; peduncles and pedicels densely ochraceous-tomentose, the pedicels 2 to 10 mm. long; disk 6 to 7 mm. high, 4.5 to (fruit) 6 mm. thick; involucre about 5-seriate, graduated, 5 to 6 mm. high, the phyllaries lance-ovate (outer) to linear-lanceolate, obtuse or acutish, the outer densely pilose-tomentose with ochraceous hairs, sometimes denudate along midline and with greenish central portion and fuscous tip, the inner loosely pilose-tomentose, usually denudate along the viscidulous greenish midline and fuscescent tip, loosely ciliate; rays 13, "brown," yellowish or ochre-yellow when dried, the tube puberulous with several-celled hairs, the lamina linear-oblanceolate, 2.5 mm. long, 0.7 mm. wide, 2 or 3-denticulate; disk flowers 14, their corollas whitish (when dry), puberulous with glanduliform hairs on throat, glandular toward tip of teeth, 4 mm. long (tube 0.5 to 0.8 mm., throat tubular-funnel-form, 2.5 mm., teeth 1 mm.); achenes sparsely glandular, or those of the ray sometimes essentially glabrous, 1.3 to 1.6 mm. long; pappus rufidulous, the outer bristles 1 to 1.8 mm. long, the inner 4 to 4.5 mm. long; style branches of medium length, linear-subulate, hispidulous.

Type in the U. S. National Herbarium, no. 531,286, collected on the headwaters of the Río López, Río Palo Basin, Tierra Adentro, State of Cauca, Colombia, altitude 2,500 to 3,000 meters, January, 1906, by H. Pittier (no. 1084).

This well marked species is related to *D. denticulatum* Blake and *D. ochraceum* (H. B. K.) Nees. The former differs in its pergamentaceous leaves with the secondary veins reticulate beneath, its short peduncles (5 to 7 mm. long in *D. denticulatum*, 18 to 25 mm. in *D. bicolor*), its shorter pedicels (4 mm. long or less), and its subglabrate involucre. The latter is described as having glabrous branches and gray-tomentose branchlets, obsoletely denticulate leaves, glabrous phyllaries, and about 5 ray flowers.

EXPLANATION OF PLATE 28.—*Diplostephium bicolor*. Type specimen. Natural size.

SPECIES OF UNCERTAIN POSITION.

DIPLOSTEPHIUM AFFINE Wedd. Chlor. And. 1: 203. 1857.

TYPE LOCALITY: Cordillera of Carabaya, Peru, altitude 3,000 to 3,500 meters. Type collected by Weddell.

Said to be allied to *D. haenkei*, but with leaves only half as large and yellowish-tomentose beneath, heads loosely corymbose, and outer pappus of subpaleaceous setae. The description is insufficient to place the species in the key.

EXCLUDED SPECIES.[8]

DIPLOSTEPHIUM CANUM A. Gray, Proc. Amer. Acad. 11: 75. 1876.

This species, based on a collection made by Edward Palmer in 1875 on Guadalupe Island, off Baja California, is now known also from several of the Santa Barbara Islands off the coast of southern California. It belongs in the genus *Aplopappus*, and should be known as **Aplopappus canus** (A. Gray) Blake. A discussion of its variations, accompanied by synonymy, will be found in Hall's paper[9] on the Compositae of southern California.

DIPLOSTEPHIUM CORYMBOSUM Donn. Sm. Bot. Gaz. **23**: 8. 1897.

This species was based on *E. W. Nelson* 3639, from Todos Santos, and *Nelson* 3644, from Hacienda de Chancol, both in the Department of Huehuetanango, Guatemala. In habit and character it is very different from true *Diplostephium*. It is evidently related to *Conyza asperifolia* (Benth.) Benth. & Hook. and *Baccharis mucronata* H. B. K., two species which are perplexingly intermediate between *Baccharis* and *Eschenbachia* (*Conyza*). The precise allocation of the species is left for further investigation.

DIPLOSTEPHIUM FOLIOSUM Rusby, Bull. N. Y. Bot. Gard. **8**: 128. 1912.

This becomes **Gynoxys foliosa** (Rusby) Blake. The species is well distinguished by its obovate or cuneate-obovate, sparsely denticulate, ternate or sometimes opposite or alternate leaves (densely lutescent-tomentose beneath), its about 16-flowered discoid heads, and its essentially glabrous involucre (7 to 8 mm. high). The type, in the herbarium of the New York Botanical Garden, was collected at Cargadira, Bolivia, altitude 2,440 meters, July 29, 1902, by R. S. Williams (no. 1529).

DIPLOSTEPHIUM PANICULATUM Donn. Sm. Bot. Gaz. **23**: 8. 1897.

In technical characters this species is closely related to *Diplostephium corymbosum* Donn. Sm., and like it is certainly not a *Diplostephium*. Its disposition must be left for further study. The species was based on *E. W. Nelson* 3629, collected between San Martin and Todos Santos, Department of Huehuetenango, Guatemala.

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[8] This list includes only species which are not disposed of in the Index Kewensis.

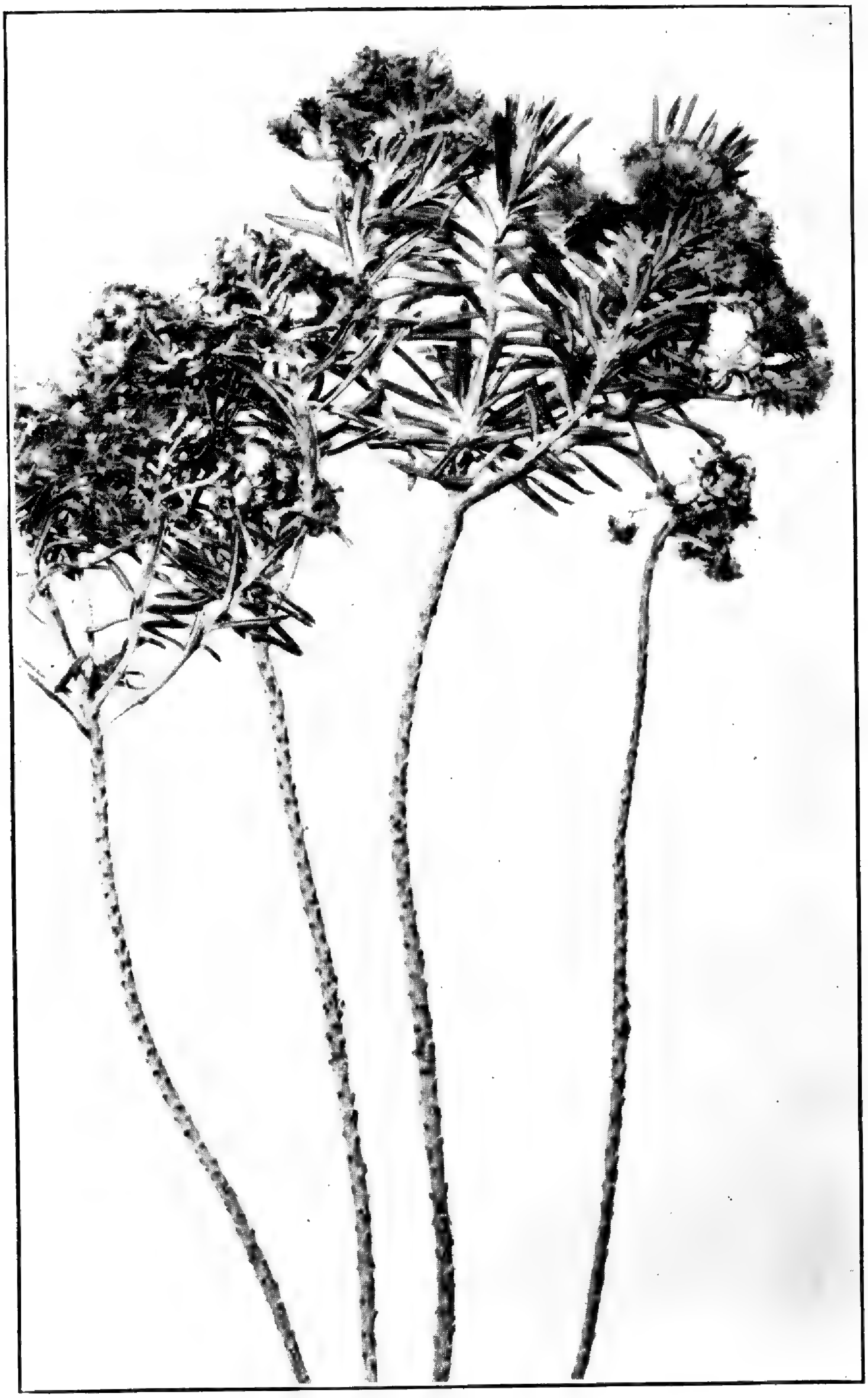
[9] Univ. Calif. Publ. Bot. **3**: 65. 1907.

DIPLOSTEPHIUM EMPETRIFOLIUM BLAKE.

DIPLOSTEPHIUM MACROCEPHALUM BLAKE.

DIPLOSTEPHIUM CICATRICOSUM BLAKE.

DIPLOSTEPHIUM OBLANCEOLATUM BLAKE.



DIPLOSTEPHIUM BACCHARIDEUM BLAKE.

DIPLOSTEPHIUM UMBELLIFERUM BLAKE.

DIPLOSTEPHIUM COSTARICENSE BLAKE.

DIPLOSTEPHIUM BICOLOR BLAKE.

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CONTRIBUTIONS

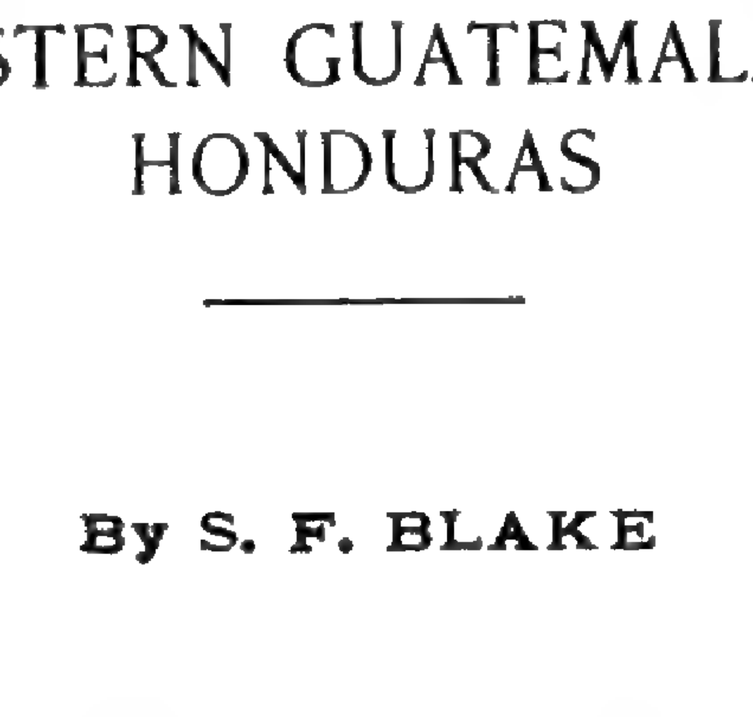
FROM THE

UNITED STATES NATIONAL HERBARIUM

VOLUME 24, PART 4

NATIVE NAMES AND USES OF SOME PLANTS OF EASTERN GUATEMALA AND HONDURAS

By S. F. BLAKE



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PREFACE.

The present paper by Dr. S. F. Blake, of the Bureau of Plant Industry, United States Department of Agriculture, contains a list of the native names and uses of the plants collected by the botanists who accompanied the Economic Survey Mission sent out in the spring of 1919 by the United States Department of State for the purpose of making a survey of the economic resources of the region in eastern Guatemala and Honduras lying between the Motagua and Chamelecón Rivers. The time spent in the field by the expedition was so short that the list is necessarily incomplete, but it contains much new and useful information, especially on the wild medicinal plants, and should be of service to travelers who may visit the same region.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

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NATIVE NAMES AND USES OF SOME PLANTS OF EASTERN GUATEMALA AND HONDURAS.

By S. F. Blake.

INTRODUCTION.

In the spring of 1919 an Economic Survey Mission of the United States State Department, headed by the late Maj. Percy H. Ashmead, made a brief examination of the natural products and resources of the region lying between the Chamelecón Valley in Honduras and the Motagua Valley in Guatemala. Work was also done by the botanists of the expedition in the vicinity of Izabal on Lake Izabal. Descriptions of the new species collected by the expedition, with a short account of its itinerary, have already been published by the writer,[1] and a number of the new forms have been illustrated. The present list is based wholly on the data and specimens collected by the botanists and foresters of this expedition—H. Pittier, S. F. Blake, G. B. Gilbert, L. R. Stadtmiller, and H. N. Whitford—and no attempt has been made to incorporate data from other regions of Central America. Such information will be found chiefly in various papers published by Henry Pittier,[2] J. N. Rose,[3] and P. C. Standley.[4]

LIST OF NATIVE NAMES AND USES.

Acacia sp. CACHITO. CORNIZUELO. ISCANAL. FABACEAE.

Acacia sp. LAGARTO. SANPEDRANO. FABACEAE.

A tree up to 25 meters high and 45 cm. in diameter. The wood is used for building.

Acalypha sp. COSTILLA DE DANTA. EUPHORBIACEAE.

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[1] Contr. U. S. Nat. Herb. **24**: 1–32. *pls. 1–10, f. 1–4.* 1922.

[2] Ensayo sobre las plantas usuales de Costa Rica. Pp. 176, *pls. 31.* Washington, D. C., 1908.

[3] Notes on useful plants of Mexico. Contr. U. S. Nat. Herb. **5**: 209–259, *pls. 28–64.* 1899.

[4] Trees and shrubs of Mexico. Contr. U. S. Nat. Herb. **23**: 1–169. 1920. This first part includes Gleicheniaceae to Betulaceae. The second part (Fagaceae to Fabaceae) is in press.

Achiotillo. See *Vismia ferruginea.*

Achras chicle Pittier. NÍSPERO. ZAPOTILLO (?). (PLATE 29.) SAPOTACEAE.

A tall tree, with medium-sized entire leaves and clusters of white flowers. This species, according to Mr. Pittier,[5] is the source of most of the chicle used in the manufacture of chewing gum, rather than *Achras zapota* L.

EXPANATION OF PLATE 29.—*Achras chicle,* from the type specimen, *Pittier* 8537, Guatemala. Natural size.

Aguacatillo. See *Phoebe ambigens.*

Alcatraz. See *Aristolochia gigas.*

Alelí. See *Gynandropsis speciosa.*

Almendro. See *Lonchocarpus izabalanus.*

Amaranthus spinosus L. HUISQUILETE. UISQUILETE. AMARANTHACEAE.

A spiny weed, abundant in the tropics.

Amate. See *Ficus crassiuscula.*

Andira excelsa H. B. K. (?)[6] GUACAMAYO. FABACEAE.

A tree up to 30 meters high and 0.5 meter in diameter. The wood is used for furniture and for building.

Andira inermis H. B. K. CHAPERNO. FABACEAE.

The heart wood of this tree is very dark and takes a good polish.

Andropogon leucostachys H. B. K. COLA DE VENADO. POACEAE.

A grass with a plumy inflorescence.

Annona glabra L. ANONILLO. ANNONACEAE.

Anoda hastata Cav. MALVAVISCO. MALVACEAE.

An herb with angled leaves, reddish along the midrib, and magenta flowers. The plant is used to make a wash for venereal diseases.

Anón de montaña. See *Cymbopetalum sp.*

Anonillo. See *Annona glabra.*

Ardisia sp. CAMACO. MYRSINACEAE.

Aristolochia gigas Lindl. ALCATRAZ. CHUMPA. ARISTOLOCHIACEAE.

A twiner with large sac-shaped lurid maroon flowers, the lower lip provided with a slender tail six inches long or more.

Arrayán. See *Myrica mexicana.*

Aspidosperma megalocarpon Muell. Arg. FUSTÁN DE VIEJA. APOCYNACEAE.

Astronium (?) sp. CIRUELO. PALO OBERO. RONRÓN. ANACARDIACEAE.

A tree up to 35 meters high and a meter thick. The trunks are used for house posts.

Baccharis rhexioides H. B. K. BARBA FINA. ASTERACEAE.

A leaning shrub, with small white downy pistillate flower heads.

Bactris sp. HUIZCOYOL. PHOENICACEAE.

A slender palm about 5 meters high, with a very spiny stem, and leaves about 1.5 meters long. The fruit is said to be violet and edible.

Balsa. See *Ochroma bicolor.*

Baltimora recta L. MIRASOL. ASTERACEAE.

A small weedy yellow composite. The name *mirasol* is used in Latin American countries for many different yellow-flowered composites.

Barajo. See *Cassia alata.*

Barba fina. See *Baccharis rhexioides.*

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[5] Pittier, Journ. Washington Acad. Sci. 9: 431–438. 1919.

[6] In a few cases the specific identity of the specimens collected by the expedition is in doubt, owing to the imperfect condition of the material preserved. This is indicated in the list by the addition of a mark of interrogation to the scientific name.

Barbasco. See *Serjania mexicana.*
Barrabas. See *Vitex longeracemosa.*
Bayal. See *Desmoncus* sp.
Bejuco chaparrón. See *Davilla kunthii.*
Bejuco comemano. See *Cissus sicyoides.*
Bejuco de culebra. See *Mandevilla auriculata.*
Bejuco de ratón. See *Stigmaphyllon mucronatum.*
Bejuco negro. See *Cordia ferruginea.*
Bellucia costaricensis Cogn. MANZANO DE MONTAÑA. MELASTOMATACEAE.

A tree, with clusters of medium-sized pinkish white flowers on the branches, broad leaves, and edible fruits.

Biophytum dendroides (H. B. K.) DC. CULANTRO DE PIEDRA BLANCA. OXALIDACEAE.

A low plant with a cluster of pinnate leaves and pinkish flowers.

Borraja. See *Heliotropium indicum.*
Borreria sp. YERBA DEL TORO. RUBIACEAE.

A small herb with white flowers. The fresh infusion is drunk for diseases of women.

Brosimum terrabanum Pittier. MASICO. MORACEAE.

A tree with milky juice, reaching a height of 30 meters and a diameter of a meter.

Brosimum utile (H. B. K.) Pittier. PALO DE LECHE. MORACEAE.
Buchnera elongata Swartz. FLOR DEL CIELO. SCROPHULARIACEAE.

A slender erect unbranched herb with violet flowers, used to decorate altars.

Buchnera lithospermifolia H. B. K. TRONERO DEL MONTE. SCROPHULARIACEAE.

Like the last, but with white flowers. Heated and applied externally in bunches for headache.

Buddleia americana L. HOJA BLANCA. LOGANIACEAE.
Byrsonima crassifolia (L.) DC. NANCÉ. MALPIGHIACEAE.

A small tree with erect spires of yellow flowers, turning orange in age. Fruit yellow and edible.

Cachicahua. See *Indigofera lespedezioides.*
Cachito. See *Calyptocarpus vialis*, also *Acacia* sp.
Calán. See *Calycophyllum candidissimum.*
Calathea insignis Peters. MÓHAN. MARANTACEAE.

An herb with canna-like leaves and a terminal spike of yellowish pink flowers inserted in thick conspicuously two-ranked scales.

Calliandra sp. SILE. FABACEAE.
Calocarpum mammosum (L.) Pierre. ZAPOTE. SAPOTACEAE.

A tree up to 25 meters high, about 45 cm. thick, with milky sap. The wood is used in building.

Calophyllum sp. SANTAMARIA. CLUSIACEAE.

A tree up to 30 meters high, nearly a meter thick, with a yellow sap. Wood used for ties and general building purposes.

Calycophyllum candidissimum DC. CALÁN. RUBIACEAE.
Calyptocarpus vialis Less. CACHITO. ASTERACEAE.

A small yellow composite with two-spined fruits.

Camaco. See *Ardisia* sp.
Caña de Cristo. See *Costus cylindricus.*
Cañafístola. See *Cassia fistula.*
Cañamito. See *Sideroxylon* (?) sp.
Canilla de pajuíl. See *Crusea* sp.
Canilla de pava. See *Polygonum punctatum.*

Caoba. See *Swietenia macrophylla.*

Capriola dactylon (L.) Kuntze. PELO DE MACHO. POACEAE.

A small widely distributed grass.

Carbón colorado. See *Cupania macrophylla.*

Carboncillo. See *Matayba* (?) sp.

Caricillo. See *Ischaemum latifolium.*

Carizo. See *Lasiacis sorghoidea.*

Casearia corymbosa H. B. K. VARA BLANCA. FLACOURTIACEAE.

A small tree with close clusters of white flowers.

Cassia alata L. BARAJO. (PLATE 30.) FABACEAE.

A shrub with yellow flowers, forming a cluster of radiating pods in fruit. An infusion of the root is used for rheumatism, and is also a powerful drastic.

EXPLANATION OF PLATE 30.—*Cassia alata*, from *Palmer* 201 (leaves), Mexico, and *Cook & Doyle* 48 (fruit), Costa Rica. Natural size.

Cassia fistula L. CAÑAFÍSTOLA. FABACEAE.

A tree with simply pinnate leaves and drooping racemes of large yellow flowers. An infusion of the beans is used as a medicine for fevers.

Cassia laevigata Willd. FRIJOLILLO. FABACEAE.

An herb with yellow flowers. The seeds are used for coffee. The plant is steamed and applied to the body for sickness, especially in women.

Cassia tora L. EJOTIL. FABACEAE.

Castilla fallax Cook. HULE CHIRRIO. TUNO. MORACEAE.

Caulote. See *Guazuma ulmifolia.*

Cecropia sp. GUARUMO. MORACEAE.

Cedrela longipes Blake. CEDRO. MELIACEAE.

A tree up to nearly 30 meters high and 0.8 meter in diameter. The wood is used for furniture and for house building.

Cedro. See *Cedrela longipes.*

Ceibillo. See *Zanthoxylum* sp.

Cenicero. See *Iresine arbuscula.*

Cerezo. See *Miconia schlimii*, also *Neea psychotrioides.*

Chacotote. See *Croton repens.*

Chamaedorea concolor Mart. PACAYA. PHOENICACEAE.

Chamaedorea ernsti-augusti Wendl. PACAYA GUARITA. PHOENICACEAE.

Chaparro. See *Curatella americana.*

Chaperno. See *Andira inermis.*

Chaptalia nutans (L.) Polak. VALERIANA. ASTERACEAE.

A composite with a tuft of basal leaves, green above and white-woolly beneath, and one or two long-stalked heads with reddish-purple rays and creamy center. The root is used medicinally.

Chapupo. See *Tabernaemontana amblyblasta.*

Chelonanthus acutangulus (Ruiz & Pav.) Gilg. TABAQUILLO. GENTIANACEAE.

A tall herb with green tubular flowers, found only in the mountains.

Chichipate. See *Sweetia panamensis.*

Chichipín. See *Hamelia erecta.*

Chile del monte. See *Stenorrhynchus* sp.

Chilillo. See *Polygonum punctatum.*

Chipilín de la montaña. See *Crotalaria sagittalis.*

Chirca. See *Croton ciliato-glandulosus*, also *C. xalapensis.*

Chlorophora tinctoria (L.) Gaud. MORA. MORACEAE.

A sparsely spiny tree up to 20 meters high, used as a dyewood.

Chozo. See *Licania hypoleuca.*

Chrysobalanus icaco L. ICACO. ROSACEAE.

A tree with white flowers, roundish veiny leaves, and blue-black plumlike fruits 1.5 to 2 cm. long, their flesh edible, sweetish but without special flavor.

Chumpa. See *Aristolochia gigas.*

Ciega vista. See *Croton ciliato-glandulosus.*

Ciruelo. See *Astronium* (?) sp.

Cissus sicyoides L. BEJUCO COMEMANO. VITACEAE.

A vine with inconspicuous greenish flowers. Used for washing clothes.

Citrus aurantiifolia (Christm.) Swingle. LIMÓN. RUTACEAE.

Clusia utilis Blake.[1] QUIEBRAMUELA. CLUSIACEAE.

A shrub 6 meters high, growing along the shore of Lake Izabal, with thick obovate leaves and rosy white flowers. The fruit is green, tinged with maroon; the seeds are surrounded by an orange aril. The buffy yellow juice of the fruit is administered on cotton for toothache. The fruit, cut across, is used by the Indians to stamp clothes, making a 6 or 7-rayed starlike figure of a permanent brown or blackish brown.

Cojón de gato. See *Tabernaemontana amblyblasta,* also *Thevetia plumeriaefolia.*

Cojón de mico. See *Tabernaemontana amblyblasta.*

Cola de marrano. See *Pithecollobium arboreum.*

Cola de mico. See *Pithecollobium arboreum.*

Cola de venado. See *Andropogon leucostachys,* also *Lasiacis procerrima.*

Comida de paloma. See *Lantana camara.*

Compsoneura sprucei (A. DC.) Warb. SANGRE. MYRISTICACEAE.

A small tree, up to 8 meters high. The bark contains a red sap.

Contamal. See *Guazuma ulmifolia,* also *Luehea seemannii.*

Contonron. See *Luehea seemannii.*

Contrayerba. See *Dorstenia contrajerva houstoni,* also *D. drakena.*

Cordia ferruginea Roem. & Schult. BEJUCO NEGRO. BORAGINACEAE.

Cordia gerascanthus L. LAUREL. BORAGINACEAE.

A tree up to 25 meters high and 50 cm. in diameter. The wood is used for ties and general construction.

Cordon. See *Piper rohrii.*

Cordoncillo. See *Piper aduncum, P. donnell-smithii,* and *P. jalapense.*

Cornizuelo. See *Acacia* sp.

Cornutia pyramidata L. HOJA DE ZOPE. VERBENACEAE.

Cortez. See *Tecoma* sp.

Costilla de danta. See *Acalypha* sp.

Costus cylindricus Roscoe. CAÑA DE CRISTO. ZINGIBERACEAE.

An herb with broad leaves and a thick spike of orange-red flowers.

Crotalaria sagittalis L. CHIPILÍN DE LA MONTAÑA. FABACEAE.

An herb with simple leaves, yellow flowers, and "rattle-box" fruit.

Croton ciliato-glandulosus Ort. CHIRCA. CIEGA VISTA. EUPHORBIACEAE.

The glandular hairs of the leaves and stem of this species adhere to the hands and injure the eyes when introduced.

Croton draco Schlecht. SANGRE DE DRAGO. EUPHORBIACEAE.

Croton repens Schlecht. CHACOTOTE. EUPHORBIACEAE.

The root is used for stomach troubles.

Croton xalapensis H. B. K. CHIRCA. EUPHORBIACEAE.

Crusea sp. CANILLA DE PAJUíL. RUBIACEAE.

An herb with violet flowers. Doves are said to eat the fruit.

Cuaulote. See *Guazuma ulmifolia.*

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[1] For illustration see Contr. U. S. Nat. Herb. **24**: *pl. 4.* 1922.

Cuje. See *Inga spuria.*

Culantrillo. See *Dichromena radicans*, also *Pectis bonplandiana.*

Culantro de piedra blanca. See *Biophytum dendroides.*

Cupania macrophylla A. Rich. CARBÓN COLORADO. SAPINDACEAE.

A tree up to 10 meters high and 20 cm. in diameter.

Cura-gusano. See *Tridax procumbens.*

Cura-mesquino. See *Euphorbia brasiliensis.*

Curatella americana L. CHAPARRO. DILLENIACEAE.

Cuturo. See *Piper aduncum* and *P. rohrii.*

Cuturo negro. See *Piper rohrii* and *Piper* sp.

Cydista pubescens Blake. ITO. BIGNONIACEAE.

Cymbopetalum penduliflorum (Dunal) Baill. ANON DE MONTAÑA. ANNONACEAE.

A tree 12 to 18 meters high, the bark furnishing a good rope.

Davilla kunthii St. Hil. BEJUCO CHAPARRÓN. DILLENIACEAE.

A vine with roundish very rough leaves. In fruit the inner sepals are indurated and closely approximated, simulating a capsule.

Decazyx macrophyllus Pittier & Blake.[8] MANGLE. RUTACEAE.

A large tree common about Los Ranchos, Honduras, with large entire dotted leaves and small white flowers. The wood is used for building.

Desmoncus sp. BAYAL. PHOENICACEAE.

Dialium divaricatum Vahl. TAMARINDO. TAMARINDO PRIETO. FABACEAE.

A tree up to 30 meters high, 0.6 meter in diameter. Wood used for ties, posts, bridges, and houses.

Dichromena radicans Cham. & Schlecht. CULANTRILLO. CYPERACEAE.

A grasslike herb with white-based involucral leaves.

Dioclea reflexa Hook. f. OJO DE MONO. FABACEAE.

Dolicholus phaseoloides (Swartz) Kuntze. FRUTA DE PITILLO. FABACEAE.

A twiner with red and black seeds.

Doradillo. See *Myrcia* (?) sp.

Dorstenia contrajerva houstoni L. CONTRAYERBA. MORACEAE.

An herb with arrow-shaped basal leaves and a crisped green yellow-bordered receptacle bearing the tiny crowded flowers. An infusion of the root is used for coughs and stomach troubles.

Dorstenia drakena L. CONTRAYERBA. MORACEAE.

The infusion is used for stomach troubles.

Drago. See *Virola merendonis.*

Echites microcalyx A. DC. FLOR DEL MICO. APOCYNACEAE.

A twiner with orange-yellow flowers.

Echúa. See *Euphorbia heterophylla.*

Ejotil. See *Cassia tora.*

Elaphrium simaruba (L.) Rose. PALO CHINO. PALO JIOTE. BURSERACEAE.

A tree up to 25 meters high, 0.5 meter in diameter, with milky juice. The wood is used for making charcoal.

Eleocharis sulcata (Roth) Nees. TULE CHIQUITO. CYPERACEAE.

Elephantopus hypomalacus Blake. OREJA DE COCHE. ASTERACEAE.

Said to be a good fodder plant.

Encino. See *Licania arborea*, also *Quercus citrifolia.*

Eneldo de montaña. See *Salvia tiliaefolia.*

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[8] For illustration see Contr. U. S. Nat. Herb. **24**: *pl. 3.* 1922.

Enterolobium cyclocarpum (Swartz) Griseb. GUANACASTE. FABACEAE.

A tree up to 30 meters high, 1 meter thick, with large ear-shaped pods. Wood used for houses and furniture.

Epidendrum fragrans Swartz. LIRIO. ORCHIDACEAE.

This and the following species belong to a large genus of bright-colored epiphytic orchids.

Epidendrum varicosum Batem. LIRIO. ORCHIDACEAE.

Eriosema diffusum (H. B. K.) G. Don. GUAPILLO. FABACEAE.

An herb with trifoliolate leaves and yellow flowers. The fresh infusion is drunk for diseases of women.

Escorzonera de jiquilite. See *Indigofera lespedezioides.*

Eupatorium pycnocephalum Less. TÉ. ASTERACEAE.

A composite with lavender flowers. Leaves used to make a sudorific tea.

Euphorbia brasiliensis Lam. CURA-MESQUINO. EUPHORBIACEAE.

Euphorbia heterophylla L. ECHÚA. EUPHORBIACEAE.

An herb with the upper leaves more or less blotched with red. The infusion is taken for diseases of the chest.

Ficus costaricana (Liebm.) Miquel. HIGO. MORACEAE.

Ficus crassiuscula Warb. AMATE. MORACEAE.

Ficus hemsleyana Standl. MATAPALO. MORACEAE.

One of the strangler figs.

Flor de la vida. See *Melanthera hastifolia.*

Flor del cielo. See *Buchnera elongata.*

Flor del mico. See *Echites microcalyx.*

Flor del tamiz. See *Polygala paludosa.*

Frijol de venado. See *Phaseolus xalapensis.*

Frijolillo. See *Cassia laevigata.*

Fruta de pitillo. See *Dolicholus phaseoloides.*

Fustán de vieja. See *Aspidosperma megalocarpon.*

Granadilla de montaña. See *Prestonia macrocarpa.*

Granadillo del monte. See *Passiflora coriacea.*

Guacamayo. See *Andira excelsa* (?).

Guambo. See *Phoebe ambigens.*

Guamo. See *Inga spuria.*

Guamo mero. See *Inga* sp.

Guamo paterno. See *Inga* sp.

Guanacaste. See *Enterolobium cyclocarpum.*

Guano. See *Ochroma bicolor.*

Guapillo. See *Eriosema diffusum.*

Guapinol. See *Hymenaea courbaril.*

Guarumo. See *Cecropia* sp.

Guarumo de montaña. See *Pourouma aspera.*

Guayabo de sabana. See *Psidium guajava.*

Guazuma ulmifolia Lam. CAULOTE. CONTAMAL. CUAULOTE. TAPACULO. STERCULIACEAE.

A tree with small white fragrant flowers.

Gynandropsis speciosa (H. B. K.) DC. ALELÍ. CAPPARIDACEAE.

Hamelia erecta Jacq. CHICHIPÍN. RUBIACEAE.

A slender shrub or tree with orange-red flowers. The leaves are mashed and put on cuts, a use doubtless suggested by the color of the flowers.

Heisteria media Blake. PATE MACHO. OLACACEAE.

Helicteres guazumaefolia H. B. K. PALO DE CAPULÍN. STERCULIACEAE.

A shrub with slender tubular salmon-red flowers.

Heliotropium indicum L. BORRAJA. BORAGINACEAE.

Higo. See *Ficus costaricana.*

Hoja blanca. See *Buddleia americana.*

Hoja de zope. See *Cornutia pyramidata.*

Homolepis aturensis (H. B. K.) Chase. TRIGO DE MONTAÑA. POACEAE.

Hormigo. See *Platymiscium polystachyum.*

Huisquilete. See *Amaranthus spinosus.*

Huizcoyol. See *Bactris* sp.

Hule chirrio. See *Castilla fallax.*

Hunierpa. See *Piper auritum amplifolium.*

Hymenaea courbaril L. GUAPINOL. PALITO COLORADO. FABACEAE.

A tree up to 10 meters high.

Hymenocallis littoralis (Jacq.) Salisb. LIRIO BLANCO. AMARYLLIDACEAE.

An herb growing in low savannas, with a cluster of flowers like an Easter lily. Grown to some extent for decoration.

Hyptis verticillata Jacq. VERBENA. MENTHACEAE.

A shrub, with whitish rather fragrant flowers. Used for stomach troubles.

Icaco. See *Chrysobalanus icaco.*

Indigofera lespedezioides H. B. K. CACHICAHUA. ESCORZONERA DE JIQUILITE. FABACEAE.

An herb with mostly 5-foliolate leaves and small salmon flowers. Used for stomach troubles.

Inga spuria (Poir.) Humb. & Bonpl. CUJE. GUAMO. FABACEAE.

A tree with white flowers. The fruit said to be greenish, half a meter long, eaten when fresh.

Inga sp. GUAMO MERO. GUAMO PATERNO. FABACEAE.

Ingerto de montaña. See *Lucuma laeteviridis.*

Iresine arbuscula Uline & Bray. CENICERO. AMARANTHACEAE.

A tree with white odorous flowers. The wood is burned and the cinders used for soap making.

Iscanal. See *Acacia* sp.

Ischaemum latifolium (Spreng.) Kunth. CARICILLO. POACEAE.

Isote. See *Yucca aloifolia* (?).

Ito. See *Cydista pubescens.*

Jatropha curcas L. PINÓN. EUPHORBIACEAE.

Jocomico. See *Rheedia intermedia.*

Jocote de mico. See *Rheedia intermedia.*

Jussiaea suffruticosa L. ONAGRACEAE.

An herb with yellow 4-petalled flowers. An infusion of the plant is used for pains in the stomach and head.

Juste. See *Sapium* sp.

Lagarto. See *Acacia* sp., also *Zanthoxylum* sp.

Lanillo. See *Ochroma bicolor.*

Lantana camara L. COMIDA DE PALOMA. VERBENACEAE.

Lasiacis procerrima (Hack.) Hitchc. COLA DE VENADO. POACEAE.

A gress with broad leaves and a large panicle, looking much like sorghum.

Lasiacis sorghoidea (Desv.) Hitchc. & Chase. CARIZO. POACEAE.

A climbing grass.

Laurel. See *Cordia gerascanthus.*

Lechuga de agua. See *Pontederia rotundifolia.*

Licania arborea Seem. ENCINO. ROSACEAE.

A tree up to 20 meters high.

Licania hypoleuca Benth. CHOZO. ROSACEAE.

Licania platypus (Hemsl.) Fritsch. SUNCO (Guatemala). URACO (Honduras).
ROSACEAE.

Limón. See *Citrus aurantiifolia.*

Lippia umbellata Cav. SECA-LECHE. VERBENACEAE.

Liquidambar. See *Liquidambar styraciflua.*

Liquidambar styraciflua L. LIQUIDAMBAR. HAMAMELIDACEAE.

The tree is tapped for the resin, and the wood is used for general building purposes. Reaches a height of 30 meters or more.

Lirio. See *Epidendrum fragrans* and *E. varicosum.*

Lirio blanco. See *Hymenocallis littoralis.*

Llallo. See *Luehea seemannii.*

Lonchocarpus izabalanus Blake. ALMENDRO. FABACEAE.

Lucuma laeteviridis Pittier. INGERTO DE MONTAÑA. ZAPOTILLO CALENTURIENTO.
SAPOTACEAE.

Luehea seemannii Triana & Planch. CONTAMAL. CONTONRON. LLALLO.
TILIACEAE.

A tree up to 25 meters high, 0.5 meter in diameter.

Lycopersicum esculentum cerasiforme (Dunal) A. Gray. TOMATE.
SOLANACEAE.

A small wild tomato, its fruit red when ripe, about the size of a cherry, sold in the markets at Los Amates and elsewhere.

Macuelizo. See *Tecoma pentaphylla.*

Malacapa. See *Zanthoxylum* sp.

Malvavisco. See *Anoda hastata.*

Mandevilla auriculata (Stadelm.) K. Sch. BEJUCO DE CULEBRA. APOCYNACEAE.

Mangle. See *Decazyx macrophyllus.*

Mano de león. See *Sterculia carthaginensis*, also *Tecoma pentaphylla.*

Manzanilla. See *Ximenia americana.*

Manzano de montaña. See *Bellucia costaricensis.*

Masico. See *Brosimum terrabanum.*

Matapalo. See *Ficus hemsleyana.*

Matayba (?) sp. CARBONCILLO. SAPINDACEAE.

A large tree with white flowers.

Media-luna. See *Passiflora coriacea.*

Meibomia axillaris (Swartz) Kuntze. MOZOTE. FABACEAE.

Meibomia scorpiurus (Swartz) KUNTZE. PEGAPEGA. FABACEAE.

The infusion is taken for fevers.

Meibomia supina (Swartz) Britton. MOZOTE. MOZOTE ANCHO. SACATE BUCHO.
FABACEAE.

Used for fodder. The infusion is drunk for gonorrhoea.

Meibomia triflora (L.) Kuntze. PLATÍ. FABACEAE.

A prostrate plant with violet flowers. The infusion is taken for stomach troubles.

Melanthera hastifolia Blake,* FLOR DE LA VIDA. ASTERACEAE.

Melanthera nivea (L.) Small. YERBA DEL CABALLO. ASTERACEAE.

An herb with white button-like heads, furnishing good fodder for horses.

Miconia lacera (Bonpl.) Naud. SIRÍN. MELASTOMATACEAE.

The name sirín is applied indiscriminately to the smaller members of this family.

Miconia schlimii Triana. CEREZO. MELASTOMATACEAE.

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* For illustration see Contr. U. S. Nat. Herb. **24**: *fig. 3.* 1922.

Mimosa pudica L. PUTA VIEJA. FABACEAE.

An herbaceous sensitive plant with pinkish-white button-like heads. The infusion is taken for gonorrhoea.

Mimosa sp. ZARZA DE RÍO. FABACEAE.

Mirasol. See *Baltimora recta.*

Móhan. See *Calathea insignis.*

Mora. See *Chlorophora tinctoria.*

Moro. See *Quararibaea* sp.

Mozote. See *Meibomia axillaris* and *M. supina.*

Mozote ancho. See *Meibomia supina.*

Myrcia (?) sp. DORADILLO. MYRTACEAE.

A tree with opposite entire dotted leaves, the timber used for houses.

Myrica mexicana Willd. ARRAYÁN. MYRICACEAE.

A shrub with white waxy berries, which are used for making candles.

Nancé. See *Byrsonima crassifolia.*

Naranjo. See *Terminalia* sp.

Neea psychotrioides Donn. Sm. CEREZO. NYCTAGINACEAE.

A shrub with purplish-red inedible fruits.

Neurolaena lobata (L.) R. Br. TRESPUNTAS. (PLATE 31.) ASTERACEAE.

An herb about 10 feet high, with three-lobed leaves and yellow heads. The infusion is taken, a cup every morning, for fever and stomach troubles.

EXPLANATION OF PLATE 31.—*Neurolaena lobata*, from *Curtiss* 403, Isle of Pines. Natural size.

Níspero. See *Achras chicle.*

Ochroma bicolor Rowlee. BALSA. GUANO. LANILLO. PALO DE BALSA. TAMBOR. BOMBACACEAE.

A tree up to 25 meters high, 0.8 meter in diameter. The very light wood is used for rafts.

Ocote (pino). See *Pinus oocarpa.*

Ojo de mono. See *Dioclea reflexa.*

Oreja de coche. See *Elephantopus hypomalacus.*

Pacaya. See *Chamaedorea concolor.*

Pacaya guarita. See *Chamaedorea ernsti-augusti.*

Pachira macrocarpa Walp. ZAPOTÓN. BOMBACACEAE.

Palacio. See *Zuelania* sp.

Palito blanco. See *Pithecolobium cognatum* (?).

Palito colorado. See *Hymenaea courbaril.*

Palo chino. See *Elaphrium simaruba.*

Palo de balsa. See *Ochroma bicolor.*

Palo de capulín. See *Helicteres guazumaefolia.*

Palo de leche. See *Brosimum utile.*

Palo jiote. See *Elaphrium simaruba.*

Palo obero. See *Astronium* (?) sp.

Panicum pulchellum Raddi. POACEAE.

A grass used to make pillows.

Passiflora coriacea Juss. GRANADILLO DEL MONTE. MEDIA-LUNA. PASSIFLORACEAE.

A twining passion flower, with leathery half-moon-shaped leaves. An infusion of the seeds is used to kill "chuchus," an unidentified insect.

Pate macho. See *Heisteria media.*

Pectis bonplandiana H. B. K. CULANTRILLO. ASTERACEAE.

A small yellow composite with dotted leaves. The infusion is taken for women's diseases.

Pegapega. See *Meibomia scorpiurus.*

Pelo de macho. See *Capriola dactylon.*

Phaseolus xalapensis H. B. K. FRIJOL DE VENADO. FABACEAE.

Phoebe ambigens Blake.[10] AGUACATILLO. GUAMBO. LAURACEAE.

A tree up to 30 meters high and a meter thick, the wood used for boards.

Pino. See *Pinus oocarpa.*

Piñon. See *Jatropha curcas.*

Pinus oocarpa Schiede. OCOTE (PINO). PINO. PINACEAE.

Wood used for houses and for firewood.

Piojillo. See *Salvia tiliaefolia.*

Piper aduncum L. CORDONCILLO. CUTURO. PIPERACEAE.

The leaves of this species are mashed in water and used as a wash for mange in dogs; the spikes are used as a flavoring for fish.

Piper auritum amplifolium C. DC. HUNIERPA. SANTAMARIA. (PLATE 32.) PIPERACEAE.

The broad leaves have a strong sassafras or sarsaparilla odor, and are used to make a refreshing tea; the spikes of flowers are used to season fish.

EXPLANATION OF PLATE 32.—*Piper auritum amplifolium,* from *Blake* 7639, Guatemala. Natural size.

Piper donnell-smithii C. DC. CORDONCILLO. PIPERACEAE.

Piper jalapense C. DC. CORDONCILLO. PIPERACEAE.

Piper rohrii C. DC. CORDON. CUTURO. CUTURO NEGRO. PIPERACEAE.

Used for washing wounds.

Piper sp. CUTURO NEGRO. PIPERACEAE.

The ashes are used for soap-making.

Pithecollobium arboreum (L.) Urban. COLA DE MARRANO. COLA DE MICO. QUEBRACHO. FABACEAE.

A tree up to 40 meters high. The wood is used for posts and houses.

Pithecollobium cognatum Benth. (?) PALITO BLANCO. FABACEAE.

Pithecollobium sp. YAGUAY. FABACEAE.

This tree furnishes a fine-grained hard wood, taking a good polish, but it is not of large size.

Platí. See *Meibomia triflora.*

Platymiscium polystachyum Benth. HORMIGO. FABACEAE.

A very important timber tree, up to 30 meters high and a meter in diameter. The wood is used for house posts and railroad ties.

Plumajillo. See *Schizolobium kellermani.*

Polygala paludosa St. Hil. FLOR DEL TAMIZ. POLYGALACEAE.

Polygonum punctatum Ell. CANILLA DE PAVA. CHILILLO. POLYGONACEAE.

The leaves are used to make a wash for mangy dogs.

Pontederia rotundifolia L. f. LECHUGA DE AGUA. PONTEDERIACEAE.

A water herb, with heart-shaped leaves and spikes of pale lavender flowers.

Pourouma aspera Tréc. GUARUMO DE MONTAÑA. MORACEAE.

Prestonia macrocarpa Hemsl. GRANADILLA DE MONTAÑA. APOCYNACEAE.

Psidium guajava L. GUAYABO DE SABANA. MYRTACEAE.

This tree or shrub furnishes the well-known edible guava fruit.

Puta vieja. See *Mimosa pudica.*

Quararibaea sp. MORO. BOMBACACEAE.

The wood of this tree is used for making ox-yokes. The leaves have a fragrance like that of slippery elm.

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[10] For illustration see Contr. U. S. Nat. Herb. **24**: *pl. 2.* 1922.

Quebracho. See *Pithecollobium arboreum*, also *Terminalia* sp.
Quercus brachystachys Benth. ROBLE. FAGACEAE.
Quercus citrifolia Liebm. ENCINO. FAGACEAE.
Quercus oleoides Cham. & Schlecht. ROBLECITO. FAGACEAE.
Quiebramuela. See *Clusia utilis.*
Randia armata (Swartz) DC. ROSETILLO. RUBIACEAE.
Rheeda intermedia Pittier. JOCOMICO. JOCOTE DE MICO. CLUSIACEAE.
Roble. See *Quercus brachystachys.*
Roblecito. See *Quercus oleoides.*
Ronrón. See *Astronium* (?) sp.
Rosetillo. See *Randia armata.*
Ruellia pilosa Pavon. VIOLETA. ACANTHACEAE.
An herb, growing in wet places, with magenta flowers.
Sacate bucho. See *Meibomia supina.*
Salvador balsam. See *Toluifera pereirae.*
Salvia tiliaefolia Vahl. ENELDO DE MONTAÑA. PÍOJILLO. MENTHACEAE.
An herb, with tiny bluish flowers. It is used to kill head lice.
Sangre. See *Compsoneura sprucei*, also *Virola merendonis.*
Sangre de drago. See *Croton draco.*
San Juan. See *Vochysia guatemalensis.*
Sanpedrano. See *Acacia* sp., also *Vochysia guatemalensis.*
Santamaria. See *Calophyllum* sp., also *Piper auritum amplifolium.*
Sapium sp. JUSTE. EUPHORBIACEAE.
Sarsaparilla. See ZARZAPARILLA.
Saurauja sp. ZAPOTILLO. DILLENIACEAE.
Sauvagesia erecta L. YERBA DEL JUDIO. OCHNACEAE.
An ascending herb with small white flowers and violet stamens.
Schizolobium kellermani Pittier. PLUMAJILLO. ZORRA. FABACEAE.
A tall, handsome tree, with slender white trunks and a feathery head of foliage.
Seca-leche. See *Lippia umbellata.*
Serjania mexicana Willd. BARBASCO. SAPINDACEAE.
A twining plant, used for poisoning fish.
Sideroxylon tempisque Pittier. TEMPISQUE. SAPOTACEAE.
Sideroxylon (?) sp. CAÑAMITO. SAPOTACEAE.
A tree with bitter red sap, the wood used for ties.
Sile. See *Calliandra* sp.
Sirín. See *Miconia lacera.*
Sisín. See *Terminalia* sp.
Smilax ornata Lemaire. ZARZAPARILLA. (PLATE 33.) LILIACEAE.
Foliage specimens of officinal sarsaparilla were collected near Izabal, and a flowering specimen has recently been sent me from the same locality by Señor M. Hernandez C. The species is said to flower in Guatemala from January to March; the root is collected from January to April, and is not valuable afterwards. The roots are done up in small bundles, tied with pieces of the stem, and dried for a week over a slow fire. They are then tied up in bundles of 100 to 150 pounds, and shipped to New York, where they bring about one cent a pound. The plant grows in swamps, and has a thick four-angled stem with strong retrorsely curved spines, and large ovate leaves sparsely spiny on the nerves beneath.

EXPLANATION OF PLATE 33.—*Smilax ornata*, from *Blake* 7865, Guatemala. Natural size.

Solanum torvum Swartz. TOMATILLO. SOLANACEAE.
Stenorrhynchus sp. CHILE DEL MONTE. ORCHIDACEAE.

Sterculia carthaginensis Cav. MANO DE LEÓN. STERCULIACEAE.

Stigmaphyllon mucronatum (DC.) A. Juss. BEJUCO DE RATÓN. MALPIGHIACEAE.

A twining herb. The fruit is said to be whitish with a blackish seed, and to be eaten by rats.

Stylosanthes guyanensis (Aubl.) Swartz. YERBA DEL CAMPO. FABACEAE.

An herb with small trifoliolate leaves and yellow flowers. An infusion of the plant is taken for pains in the side.

Sunco. See *Licania platypus.*

Suquinay. See *Vernonia aschenborniana.*

Sweetia panamensis Benth. CHICHIPATE. FABACEAE.

A tree up to 30 meters high. The wood is used for posts, ties, and houses.

Swietenia macrophylla King. CAOBA. MELIACEAE.

This, the Honduras mahogany, occurs on the eastern coast of Central America from Campeche to Honduras and for an undetermined distance southward, and is at present the most important species of mahogany commercially.

Symphonia globulifera L. f. VARILLO. CLUSIACEAE.

Tabaquillo. See *Chelonanthus acutangulus.*

Tabernaemontana amblyblasta Blake.[11] CHAPUPO. COJÓN DE GATO. COJÓN DE MICO. APOCYNACEAE.

A shrub about 5 meters high, with panicles of creamy-yellow flowers and opposite entire leaves. The fruit is said to be green or yellow. The milky juice of this plant is mixed with chicle for local use. It is also put on the flesh with a piece of tobacco leaf to draw out carnivorous insect larvae.

Talauma poasana Pittier (?). YOROCONTE. MAGNOLIACEAE.

A tree up to 40 meters high. The wood is used for posts and house construction.

Tamarindo. See *Dialium divaricatum*, also *Terminalia* sp.

Tamarindo prieto. See *Dialium divaricatum.*

Tambor. See *Ochroma bicolor.*

Tapaculo. See *Guazuma ulmifolia.*

Té. See *Eupatorium pycnocephalum.*

Tecoma pentaphylla Juss. MACUELIZO (?). MANO DE LEÓN. BIGNONIACEAE.

A tree up to 25 meters high, with palmately compound leaves and large pink flowers. The wood is used in house building.

Tecoma sp. CORTEZ. BIGNONIACEAE.

Tempisque. See *Sideroxylon tempisque.*

Terminalia sp. NARANJO. QUEBRACHO. SISÍN. TAMARINDO. COMBRETACEAE.

The wood of this tree is used for ties and general construction.

Thevetia plumeriaefolia Benth. CÓJON DE GATO. APOCYNACEAE.

Toluifera pereirae (Klotzsch) Baill. SALVADOR BALSAM. FABACEAE.

This tree grows on the mountain crests around La Florida, Honduras, and a small amount of the balsam is extracted for commercial purposes.

Tomate. See *Lycopersicum esculentum cerasiforme.*

Tomatillo. See *Solanum torvum.*

Trespuntas. See *Neurolaena lobata.*

Tridax procumbens L. CURA-GUSANO. ASTERACEAE.

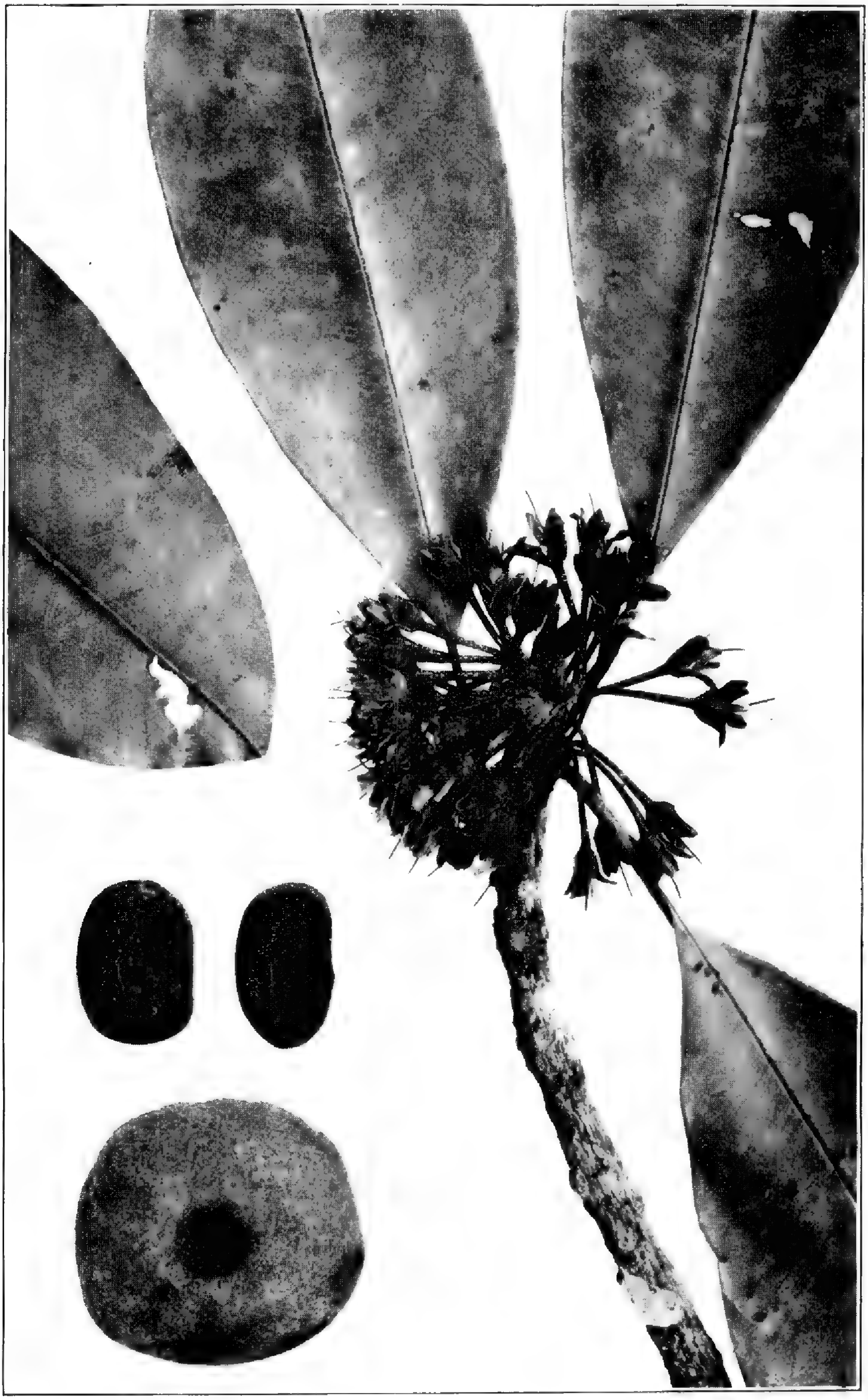
A trailing herb with creamy-yellow rays and yellow disk. The leaves are put on the flesh to kill carnivorous insect larvae.

Trigo de montaña. See *Homolepis aturensis.*

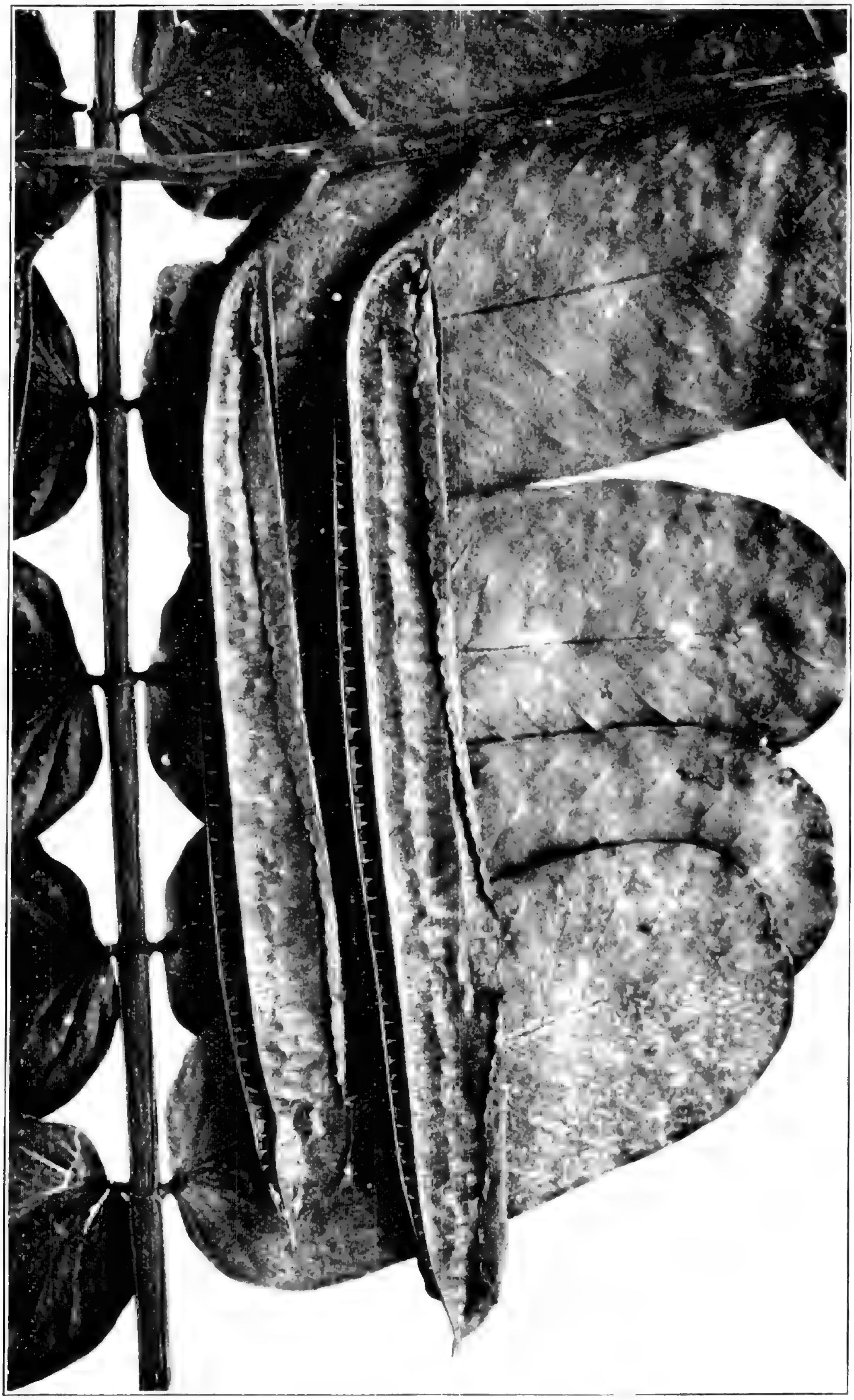
---

[11] For illustration see Contr. U. S. Nat. Herb. **24**: *pl. 6.* 1922.

Tronero del monte. See *Buchnera lithospermifolia.*
Tule chiquito. See *Eleocharis sulcata.*
Tuno. See *Castilla fallax.*
Uisquilete. See *Amaranthus spinosus.*
Uraco. See *Licania platypus.*
Valeriana. See *Chaptalia nutans.*
Vara blanca. See *Casearia corymbosa.*
Varillo. See *Symphonia globulifera.*
Verbena. See *Hyptis verticillata.*
Vernonia aschenborniana Schauer. SUQUINAY. ASTERACEAE.
A shrub with purplish flowers, used for stomach troubles.
Violeta. See *Ruellia pilosa.*
Virola merendonis Pittier. DRAGO. SANGRE. MYRISTICACEAE.
A tree up to 35 meters high, with leaves rusty-tomentose beneath, and a red sap. The wood is used for boards. The fruits are eaten by fishes.
Vismia ferruginea H. B. K. ACHIOTILLO. HYPERICACEAE.
Vitex longeracemosa Pittier. BARRABAS (?). VERBENACEAE.
A tree with palmately compound leaves and lilac flowers.
Vochysia guatemalensis Donn. Sm. SAN JUAN. SANPEDRANO. VOCHYSIACEAE.
A tree up to 25 meters high, with slender yellow flowers. The wood is used for boards.
Ximenia americana L. MANZANILLA. OLACACEAE.
A tree with yellow astringent fruits, the size of a small plum, generally eaten cooked.
Yaguay. See *Pithecollobium* sp.
Yerba del caballo. See *Melanthera nivea.*
Yerba del campo. See *Stylosanthes guyanensis.*
Yerba del judio. See *Sauvagesia erecta.*
Yerba del toro. See *Borreria* sp.
Yoroconte. See *Talauma poasana* (?).
Yucca aloifolia L. (?) ISOTE. LILIACEAE.
A quick-growing tree, with large white flowers in a terminal panicle. A specimen about 18 feet high and 30 inches in circumference was said to be only about 8 years old. The flower cluster is cooked in salted water and eaten, but is rather bitter. Rope is made from the fibre of the leaves.
Zanthoxylum sp. CEIBILLO. LAGARTO. MALACAPA. RUTACEAE.
Zapote. See *Calocarpum mammosum.*
Zapotillo. See *Achras chicle*, also *Saurauja* sp.
Zapotillo calenturiento. See *Lucuma laeteviridis.*
Zapotón. See *Pachira macrocarpa.*
Zarza de rio. See *Mimosa* sp.
Zarzaparilla. See *Smilax ornata.*
Zexmenia frutescens (Mill.) Blake. ASTERACEAE.
A composite with yellow flowers. Said to furnish a medicine for infantile fevers.
Zorra. See *Schizolobium kellermani.*
Zuelania sp. PALACIO. FLACOURTIACEAE.



ACHRAS CHICLE PITTIER.



CASSIA ALATA L.

NEUROLAENA LOBATA (L.) R. BR.

PIPER AURITUM AMPLIFOLIUM C. D C.

SMILAX ORNATA LEMAIRE.

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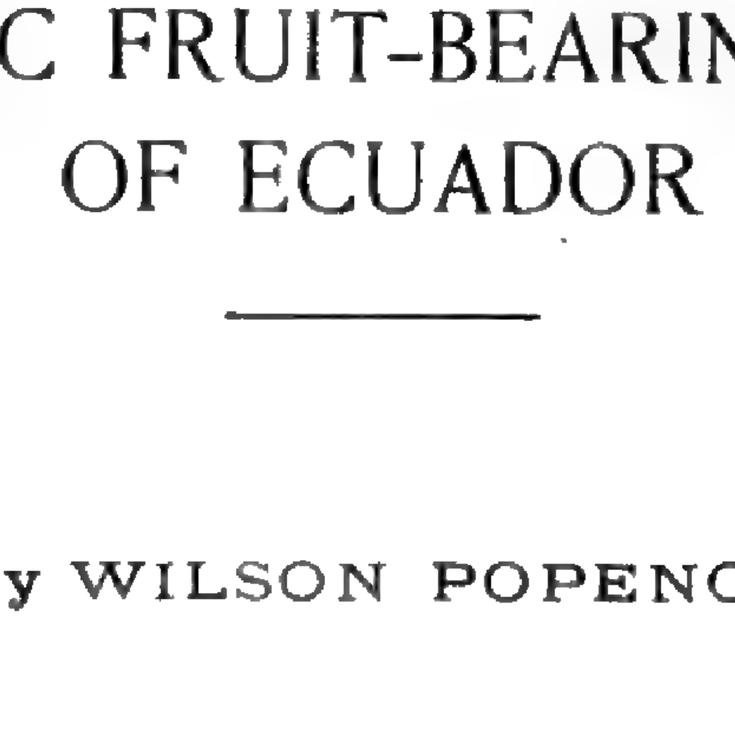
ECONOMIC FRUIT-BEARING PLANTS OF ECUADOR

By WILSON POPENOE



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PREFACE.

Northwestern South America is rich in new or little known plants the fruits of which are of economic value. The present paper, by Mr. Wilson Popenoe, agricultural explorer of the United States Department of Agriculture, is a result of eight months' work in the Republic of Ecuador, where an effort was made to obtain data concerning the distribution, common names, and uses of all cultivated fruit-bearing plants, as well as of wild ones the fruits of which are utilized by Ecuadorians.

Except for a few popular and fragmentary accounts, practically nothing has been published previously on the subject, and even the nomenclature of some of the species included in the present paper has been generally confused. The paucity of published knowledge concerning the economic botany of northern South America is well known, and it is believed the present contribution materially increases the available information on an important subject. Numerous species herein discussed have been introduced recently into the United States, where they are under test by horticulturists throughout those regions to which they seem likely to prove adaptable.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

ILLUSTRATIONS.

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ECONOMIC FRUIT-BEARING PLANTS OF ECUADOR

By Wilson Popenoe

INTRODUCTION.

With a fertile coastal plain lying exactly under the Equator, with cool, semiarid highland valleys and plains whose climate is subtropical in character, and with moist cultivated slopes scarcely below the snow line, Ecuador is enabled to grow an extremely wide range of fruits. Although these advantages have scarcely been exploited commercially as yet, a large number of exotic fruit-bearing plants have become established in the Republic, and there are numerous indigenous species of economic importance.

Upon the littoral are to be found the cosmopolitan fruits of the Tropics, such as the mango, the orange, and the banana. In addition to these, a number of Asiatic species, including the mangosteen, the lychee, and the breadfruit, have been planted in the vicinity of Guayaquil, where they have proved altogether successful.

In the fertile highland valleys, and on the plateaus of moderate elevation,—those of Cuenca, Ambato, Quito, and Ibarra, for example—the apple, peach, pear, and other fruits of the Temperate Zone are abundantly cultivated. Alongside them are to be seen such native species as the chirimoya (*Annona cherimola*), the mora de Castilla or Andes berry (*Rubus glaucus*), and the chamburo (*Carica candamarcensis*.

Toward the upper limit of cultivation, on the cold bleak *páramos* or rolling plains, where drizzling rains fall nearly every day in the year, the mortiño or Andean blueberry (*Vaccinium floribundum*) grows in great profusion, while several wild blackberries and raspberries, the tacsos (*Passiflora* spp.), and other native plants yield fruits of interest and value. Many of these Andean fruits are unfamiliar to horticulturists of other regions and several of them have not even received botanical attention. Two species of *Carica* included in the present paper, both cultivated in the highlands of Ecuador, were named and described by the Swedish botanist Heilborn in 1921, while one *Passiflora*, two species of *Disterigma*, and two of *Macleania* have been named from material collected during the course

of the investigations that have furnished the data for the present paper. Of the genus *Inga*, and of numerous other genera, there are interesting species in Ecuador that have yet to be studied and described.

It will readily be seen, therefore, that much remains to be learned on the subject of Ecuadorian fruits. Little has been published in past years. The well-known work of Teodoro Wolf, *Ecuador*, contains interesting notes, gathered at first hand, concerning a number of species, but very few details are included. The classic and delightful work of Father Juan de Velasco, *Historia del Reino de Quito*, written in 1789, is replete with interesting accounts of Ecuadorian plants and animals; yet it can not be considered of great practical value at the present day. Luis Cordero, one time President of the Republic and a devoted student of horticulture, has brought together many interesting facts concerning the fruits of the Cuenca region in his *Enumeración de Plantas*, published in 1911. The work, unfortunately, is not botanically sound.

It is hoped that the present paper will serve to place on record more facts concerning Ecuadorian fruits than have been brought together elsewhere. The data herein set forth were collected during an eight months' exploration of the Republic, conducted on behalf of the United States Department of Agriculture with the object of determining in what manner a mutually beneficial exchange of seeds and plants might be established between the United States and Ecuador. In the course of this work numerous overland trips were made, and the inter-Andean region from the Colombian frontier to that of Peru was examined carefully. A journey was made along the coast, from Esmeraldas southward to Machala, followed by a trip from the latter point to Loja. Unfortunately, it was not possible to visit the vast plains and forests of eastern Ecuador—the region known as El Oriente; but in view of the fact that this part of the Republic is inhabited only by a few Indians, and that it is known to contain relatively few useful fruits that are not found elsewhere, the omission may not be so important as might at first appear. A sojourn of 10 days in the vicinity of Baños, on the Pastaza River in Tungurahua Province, furnished an opportunity to obtain a few data on this little-known region.

Except in those instances in which the identity of the species was beyond question, the botanical names herein used are based upon herbarium material collected at the time the notes on the geographical distribution, common names, and uses of the fruits were made. It should be remembered, of course, that a single common name may be applied, in different regions, to several plants quite distinct botanically. The confusion in the use of the names *chamburo* and *chil-*

huacán for species of *Carica* is noteworthy. In order to eliminate as far as possible, the danger of drawing incorrect inferences, an effort has been made to show the precise region in which a given name is applied to a given species.

It is not to be assumed that the species discussed in this paper are cultivated or found growing wild only in the regions mentioned under each heading. On the contrary, most of them occur in numerous other parts of the country, but for purposes of accuracy it has seemed best to list only those places in which the species under consideration were actually seen. Stress may well be placed upon the importance of observing the elevation at which species grow in a country such as Ecuador. Altitude plays so important a part in controlling climate throughout the Tropics that the first thing to be noted concerning any plant is its altitudinal range.

I am indebted to Sidney F. Blake and Donald C. Peattie of the Bureau of Plant Industry for determining the specimens collected in Ecuador. I also wish to express my hearty appreciation of many courtesies received at the hands of Hon. Charles S. Hartman, formerly American minister at Quito and Dr. F. W. Goding, American consul general at Guayaquil, and my thanks to Prof. Abelardo Pachano, of Ambato, and Sr. José Felix Tamayo, of Ibarra, for much assistance in gathering data on Ecuadorian fruits.

PHOENICACEAE.

Cocos nucifera L.

Coco; along the coast, and toward the interior, up to elevations of about 1,500 meters, occasionally 1,800 meters. Above the latter elevation it is rarely seen.

Although the coconut is abundant along the Ecuadorian littoral, few commercial plantings have been made. The largest grove is probably that belonging to the heirs of Alejandro Ganto, near Bahía de Caraquez.

Jubaea chilensis (Molina) Baill.

Jubaea spectabilis H. B. K.

Coco de Chile at Ambato, where it occurs only in a very few gardens; *coco chileno* at Otavalo, where there are two fine specimens. The latter name, as well as *coquito de Chile*, is used at Loja, where there are a number of plants, the fruits being sometimes sold in the market.

This palm has a very stout trunk and stiff pinnate leaves 3 to 4.5 meters in length. The fruit, which is produced in large racemes, is top-shaped, about 4 cm. long, and deep yellow. The kernel is eaten.

This species, which has probably been introduced into Ecuador from Chile, is seen only in the highlands. It is not abundantly cultivated.

Guilielma speciosa Mart.

Chontaduro (correctly *chontaruru*) on both the eastern and western slopes of the Andes, below elevations of 1,200 meters, extending down onto the coastal plain. It is said to occur in great abundance along the Río Cayapas, in northwestern Ecuador, and in the eastern part of the Republic, popularly known as the Oriente.

This valuable food plant has been much used by the Indians of northern South America since pre-Columbian times. It is a handsome tree, the slender trunk reach-

ing an ultimate height of about 12 meters, effectively armed with long black spines. The leaves are pinnate, very graceful in appearance, and 2.5 to 3.5 meters in length. The fruits, which are borne in racemes containing in some instances as many as 2,000, are top-shaped, 3 to 5 cm. long, and orange brown in color; they have deep yellow, farinaceous flesh, in which is embedded the single bony seed. To render them palatable they must be boiled, after which they have the flavor and consistency of roasted chestnuts.

This species is very close to *G. utilis* Oerst., the *pejibaye* of Costa Rica, if, indeed, further study does not show them to be identical.

BROMELIACEAE.

Ananas sativus Schult. f.

Piña in all parts of Ecuador; commonly cultivated from sea level up to elevations of 1,800 meters, and marketed in all the principal towns of the country.

The pineapples of Guayaquil are famous for their exquisite flavor. They are produced mainly in the vicinity of Milagro, some 30 kilometers east of the port, and are of a variety that appears either to be Smooth Cayenne or very close to it. The commercial cultivation of this variety is rather important and capable of great extension, although for exporting to Peru and Chile (which is at present the ambition of cultivators) a pineapple with better shipping qualities would be preferable.

There are, in various parts of the country, several varieties of this fruit, but no other is equal to the Guayaquil pineapple in quality. The worthy Padre Juan de Velasco, writing in 1789, said: "There are two varieties, one with yellow flesh and little juice, the other, called *cambray*, white, and much more delicate; but both are of equal fragrance and sweetness." Probably his *cambray* is the variety now grown at Milagro, but no longer known by that name, the name *cambray* being now applied to a rather uncommon form, with large fruits, and yellowish flesh of very fair quality, not so sweet as the Guayaquil variety (to use a name not locally applied, but one by which this pineapple has become more or less known in other countries).

The pineapples of northern Ecuador, e. g. the Chota Valley, are small, oblong, with yellow flesh of sweet and pleasant flavor but of woody texture. Occasionally the Guayaquil variety is seen in that part of the country, where it is known as *piña de leche*. At elevations of 2,100 meters in the Province of Imbabura the latter variety does not become sweet, as at Guayaquil, and is in fact inferior in quality to the small yellow pineapple. This yellow pineapple is rather common in the lower regions of the Sierra, between elevations of 1,500 and 2,300 meters.

MUSACEAE.

Musa paradisiaca L.

Plátano throughout the Republic. Cultivated in the coastal lowlands, and thence upward to altitudes of about 2,100 meters.

The plantain is one of the principal food plants of the lowlands, and is abundant in the markets of nearly all the highland towns, being carried to them from near-by regions of lower elevation. The historian Gonzales Suárez asserts, without saying on what grounds, that this was one of the food plants of the pre-Columbian inhabitants of Ecuador.

Musa paradisiaca sapientum (L.) Kuntze.

Guineo and *banano* throughout the country. Cultivated extensively in the Province of Guayas, whence the fruit is exported to Peru and Chile. Elsewhere it is grown for local consumption, and for near-by markets. The upper limit of its cultivation is about 2,300 meters.

Numerous varieties of the banana are cultivated in Ecuador. Those known as *seda*, *morado*, and *de oro* are among the commonest. No study has been made of these, to determine their relationships with the varieties of other countries. As in other parts of tropical America, the banana is one of the important food plants in regions of low or moderate elevation, and it is carried in considerable quantities from the coast to the markets of Quito.

JUGLANDACEAE.

Juglans honorei Dode. PLATE 34.

Tocte, applied to the fruit, and sometimes to the tree; the latter is also called *nogal*. Found at altitudes between 1,800 and 3,000 meters; abundantly grown in nearly every highland town.

Luis Cordero says of this tree in the Azuay and Cañar, "It is most useful, since it furnishes, aside from its graceful fruit and its fine, solid, and beautiful wood, a tonic of probable efficacy, made by boiling the leaves." The plant is much used by the Indians of Imbabura in the preparation of dyes. It is very abundant at Ambato, but can scarcely be termed a cultivated species in this region, since it is not generally planted in gardens, being allowed to grow up about the edges of fields and *huertas*. The nuts are 2.5 to 4 cm. in diameter, with a very thick, bony shell, deeply corrugated on the surface, and a kernel of rich and pleasant flavor. Recently the species has been cultivated at Ambato as a stock plant on which to graft *Juglans regia*.

At Ibarra the tree is very abundant, and the nuts are commonly sold in the market. They are used to prepare a famous sweetmeat, the *nogada* of Ibarra, made from brown or white sugar, milk, and walnut meats. At Otavalo the tree is abundant, as also in the southern part of Ecuador at Loja and Cuenca.

Juglans regia L.

Nuez (the tree, *nogal*) at Ambato, where it is cultivated commercially on a small scale. There are a few trees at Otavalo and Ibarra, in Imbabura Province, and a few in the southern Provinces of Azuay and Cañar.

This, the English walnut of other countries, or more correctly the Persian walnut, is grown successfully at Ambato. Most of the trees are seedlings, and their fruit is rather small, though of excellent quality. The introduction of choice varieties is to be desired.

At Ambato there are two trees that appear to be hybrids between this species and the indigenous black walnut (*J. honorei*). One is found in the town itself, the other at La Viña, a few miles from Ambato on the railroad to Pelileo. The one at La Viña is a large and very handsome tree, more than double the size of *J. regia*, as the latter grows in Ecuador. Both produce nuts which appear to be intermediate in character between those of the two supposed parent species.

MORACEAE.

Morus nigra L.

Mora in all the provinces of the Sierra, from Imbabura to Loja, where it is occasionally cultivated. The leaves are ovate, acuminate, and serrate, 10 to 15 cm. long. The fruit is sometimes sold in the market of Ambato, but in general is not much used in Ecuador.

This is the common black mulberry of southern Europe, introduced by the Spaniards into numerous parts of tropical America.

Artocarpus communis Forst.

Árbol de pan (the tree) and *fruta de pan* (the fruit), on the coast. It is grown principally in the Province of Guayas, and even here does not become a product of much commercial importance. It has been planted in a few of the warmer inter-Andean valleys.

The breadfruit tree is one of the handsomest to be seen within the Tropics, and for this reason it is often planted for ornamental purposes. It attains 12 to 15 meters in height; its glossy, deep green leaves are entire toward the base, three to nine-lobed toward the upper end, and often 30 cm. in length. The staminate flowers grow in dense, yellow, club-shaped catkins; the pistillate, which are borne upon the same tree, are grouped together to form a large prickly head upon a spongy receptacle. The ripe fruit, which is composed of the matured ovaries of the pistillate flowers, is round or oval in form, commonly 10 to 20 cm. in length, greenish brown at maturity or at times almost yellow. The pulp is somewhat fibrous, yellowish white in the fully ripe fruit, and starchy in character. It is cooked before being eaten.

The best varieties of the breadfruit are seedless, and can be propagated only by cuttings or suckers. The tree is a native of the Malayan Archipelago, and was introduced into the tropical regions of America by the British Government in 1792.

Ficus carica L.

Higo and *breva*, the latter name being applied to fruits of the first crop, the former to those of the second or main crop, throughout the highlands, where it is cultivated at Ibarra, Otavalo, Quito, Ambato, Cuenca, Loja, and elsewhere. It is very successful as a fruit-bearing tree, and its cultivation might profitably be extended, in certain regions, to place it upon a commercial basis. There are as yet no commercial plantations in Ecuador.

Two sorts of figs, both doubtless brought from Spain in colonial days, are cultivated in Ecuador: one is black fruited, the other white or, properly, green. There is much confusion in regard to the application of the names *higo* and *breva*. By some Ecuadorians the largest fruits of the black fig are called *brevas*, and all others *higos*. Properly speaking, there are *higos* and *brevas* of both varieties, the name depending only upon the time of ripening. Luis Cordero says: "The fig * * * grows and fruits well in protected sections of both provinces (Azuay and Cañar), especially in Gualaceo and Paute. The earliest fruits are called *brevas*, because of the promptness of their ripening; the later and smaller ones are properly called *higos*. The green variety, which is called "higo blanco", was brought from the north only a short time ago. It is cultivated with success, and is highly appreciated for its sweetness of flavor and delicacy of texture."

ANNONACEAE.

Annona cherimola Mill.

Chirimoya (Quichua: *chiri*, cold, and *muyu*, seed); throughout the Sierra. In some of the towns of the coast this name is incorrectly applied to *Annona squamosa*.

Alphonse DeCandolle wrote concerning the origin of the chirimoya, "I consider it most probable that the species is indigenous in Ecuador, and perhaps in the neighboring part of Peru." Teodoro Wolf (p. 439) reported having found it "in a wild state, and forming small groves, in the mountains of Loja Province, for example, between Loja and Malacatos, at altitudes of 1,800 to 2,000 meters." Following the indication of Wolf, I have visited the Province of Loja and have personally observed the tree in such abundance, and in such an evidently spontaneous state, that no doubt is left in my own mind regarding its indigenous character.[1] The chirimoya is certainly an Ecuadorian species, probably entitled to be considered the finest fruit which that country has produced.

Aside from the considerable groves of wild trees, found throughout the southern part of Loja Province at elevations between 1,400 and 2,000 meters, the species is

[1] See Wilson Popenoe, The Native Home of the Cherimoya, Journal of Heredity 12: 331–336. 1921.

cultivated abundantly in all those regions of the sierra where climatic conditions are favorable. Luis Cordero says regarding Cañar and the Azuay, "This tree yields one of our best fruits, the sweet and fragrant chirimoya, justly appreciated in the markets. It is produced by our valleys of moderate temperatures, such as Paute and Gualaceo." It is occasionally seen in the *huertas* of Ambato, where it is not, however, altogether successful as a fruit-bearing tree, the climate of this region being too cool for it. At Baños, Tungurahua, at an elevation of 1,800 meters, it is cultivated rather commonly. The markets of Quito are abundantly supplied with fruits of excellent quality from the valley of the Río Guaillabamba, a few miles north of the city. There are a few trees in Otavalo, in the Province of Imbabura, these fairly thrifty, and there are many in the gardens of Ibarra. Much of the fruit sold in the latter town, however, is brought from the haciendas situated in the Chota Valley.

The chirimoya is a small, erect or somewhat spreading tree, rarely growing to a height of more than 7.5 meters. The leaves are ovate to ovate-lanceolate, commonly 10 to 15 cm. long, sparsely hairy above, and velvety-tomentose below. The fragrant, greenish white flowers are 2.5 cm. in length, solitary or sometimes two or three together, on short nodding peduncles in the leaf axils. The fruit is commonly heart-shaped, conical, oval, or somewhat irregular in form, and from 100 grams to 2 kilograms in weight. The surface is smooth in some varieties, in others covered with small conical protuberances; it is light green, with the skin thin and delicate. The flesh is white, melting, and of subacid, delicate flavor, suggesting that of the pine-apple and the banana; in it are embedded numerous brown seeds the size and shape of a common bean.

Little attention is given to the cultivation of this fruit in Ecuador, the trees all being propagated by means of seed. Very rarely they are planted in orchard form. The fruit is a favorite in the markets, and is carried to the coast from the inter-Andean regions where it is produced.

Annona muricata L.

Guanábana, on the coast, where it is commonly cultivated. It is occasionally grown in some of the hot inter-Andean valleys of moderate elevation, such as the valley of the Chota, in the northern part of Ecuador. It is rarely grown at elevations higher than 1,200 meters.

The soursop, as the species is called in English, is a small tree, slender in habit and rarely more than 6 meters high. The leaves are obovate to elliptic, 6 to 15 cm. long, leathery, glossy above, and glabrous on the lower surface. The flowers are large, and the fruit is the largest of the anonas; specimens weighing 2 kilograms are common. It is ovoid, heart-shaped, or conical, dark green, with many short fleshy spines on the surface. The flesh is white, somewhat cottony in texture, juicy, and of a highly aromatic flavor, somewhat resembling that of the pineapple. The seeds are much like those of the chirimoya. The soursop is native in tropical America.

Annona reticulata L.

Anona in the coastal lowlands, where it is cultivated rather commonly. It is rarely seen at elevations above 1,500 meters.

This is the bullock-heart or custard-apple of English-speaking countries, inferior in quality to several other species of *Annona*, but nevertheless common in many parts of the Tropics. The tree is commonly 6 to 7.5 meters high. The leaves are oblong-lanceolate to lanceolate, 10 to 15 cm. in length, and glabrate. The flowers, which are borne in small clusters upon the new branchlets, are about 2.5 cm. long. The fruit is commonly heart-shaped, but it may be conical, oval, or irregular in form. It weighs from 100 grams to more than a kilogram; the surface is smooth, usually reddish yellow or reddish brown in the ripe fruit, and divided by impressed lines into 5 or 6-angled areas. The flesh, which contains numerous brown seeds the size of

a small bean, is milk-white, granular near the thin skin, and sweet, even insipid in flavor. Like most of the other species of *Annona*, this is a native of tropical America

Annona squamosa L.

Chirimoya, in the vicinity of Guayaquil, to which city the fruits are brought in considerable quantities from the Island of Puna. The common name properly belongs to *Annona cherimola*, and its application to *A. squamosa* has resulted in confusing the two species in the minds of many Ecuadorians.

The sugar-apple, as this species is called in English, is a smaller tree than most other species of *Annona*, its maximum height being about 5 meters. The leaves are lanceolate or oblong-lanceolate in outline, 5 to 10 cm. long, pale green on both surfaces, and nearly glabrous; they closely resemble those of *A. reticulata* except in their smaller size. The flowers, which are produced singly or in clusters of two to four, also resemble those of *A. reticulata*. The fruit, however, is of very different appearance from that of the last-named species; it is round, heart-shaped, ovoid or conical, 5 to 7.5 cm. in diameter, and yellowish green. The surface is tuberculate and covered with a whitish bloom. The pulp is white, custard-like, and of a pleasantly acidulous flavor. The seeds are much like those of other species. When grown in a hot, dry climate, this is often a fruit of excellent quality, never equal, however, to a good specimen of the true chirimoya in richness of flavor. It is a native of tropical America.

LAURACEAE.

Persea americana Mill.

Persea gratissima Gaertn. f.

Aguacate, in all parts of the country; also called *palta* in some parts of Loja Province. This species, the common avocado of tropical lowlands, is grown abundantly in the Province of Guayas and less commonly elsewhere in the coastal lowlands. There are many trees in the valley of the Río Chota, in northern Ecuador, at 1,500 meters altitude, and numerous others in the central and southern portions of Loja Province, at altitudes of 1,200 to 1,500 meters. It was not seen at elevations above 1,800 meters.

This tree, the West Indian avocado of North American horticulturists, is distinguished from the highland or Mexican avocado (*P. americana drymifolia*) by its foliage, which, when crushed, has none of the aniselike odor characteristic of the latter; and by its fruit, which has a thick, leathery skin, in place of a thin, membranous one.

There is a famous tree in the town of Esmeraldas, which yields avocados a kilogram in weight and of excellent quality. Some good fruits are produced in the Province of Guayas, also; but in general it may be said that the avocados of this race which are grown in Ecuador are inferior to the best from Cuba and Florida.

Persea americana drymifolia (Cham. & Schlecht.) Blake. PLATE 35.

Aguacate, in all parts of the country where it is known. It is cultivated abundantly in the Chota Valley of northern Ecuador, at altitudes of 1,500 to 2,100 meters; at Ibarra (2,200 meters) and Otavalo (2,600 meters); in the Guaillabamba Valley, north of Quito, at 1,800 to 2,100 meters; at Quito (2,900 meters), though it is not common there; at Ambato (2,600 meters), and from this point down the Ambato River (later called the Patate and then the Pastaza) to the town of Baños (1,800 meters); at Cuenca (2,600 meters) and Loja (2,200 meters), and in numerous other places throughout the highlands. It is not grown in the coastal lowlands.

This variety, the Mexican avocado of North American horticulturists, is distinguished from the West Indian or lowland avocado (*P. americana*) by the aniselike odor which the leaves give off when crushed, and by the thin membranous skin of the fruit.

Most of the seedlings cultivated in the Ecuadorian highlands are inferior in quality. Those of Ambato and the Patate Valley are mostly small-fruited, as also those of the Guaillabamba Valley, which supplies the Quito markets with avocados. In the Chota Valley, contributing to the Ibarra market, there are some unusually choice forms of this avocado, some of the fruits weighing as much as a half a kilogram and being of excellent quality, with small seeds.

GROSSULARIACEAE.

Ribes punctatum Ruiz & Pav.

Grosella, in the province of Carchi, where it occurs at altitudes between 3,400 and 3,700 meters. It is not cultivated, but grows in ravines of the *páramo* or cold, moist region.

This Andean currant is a shrub reaching 2 meters in height; leaves broadly ovate, subcrenate, sometimes slightly lobed, truncate at the base, and about 2.5 cm. in length. The round, orange-yellow fruits, rarely more than 6 mm. in diameter, are borne on axillary racemes about 5 cm. long. They are subacid, and not very agreeable in flavor, and are little used by the inhabitants of the region in which they grow.

MALACEAE.

Osteomeles obtusifolia (Pers.) Kunth.

Quiqui, in the Province of Loja, where it is common at elevations of 2,100 to 2,400 meters. It is not cultivated, and is not much esteemed as a fruit-bearing species.

The plant, which grows along the edges of ravines and among scrub, is an arborescent shrub reaching a height of 4.5 meters. It is armed with long sharp thorns, and its leaves are oblong-elliptic, blunt or acute at the apex, dentate, commonly 2.5 cm. in length. The fruits, which are produced in small terminal clusters, are globose to oblate, deep red, and up to a centimeter in diameter. Within the thin skin is a small quantity of yellowish, mealy flesh surrounding the several hard seeds. The flavor of the fruit is subacid and slightly acrid, resembling that of the haw (*Crataegus*).

Cydonia oblonga Mill.

Cydonia vulgaris Pers.

Membrillo throughout the inter-Andean region; cultivated rather commonly in many of the highland towns, from the Carchi to Loja. Two varieties of the quince are grown at Ambato, one producing fruits rather elongate in form, and sweet, the other round and somewhat acrid fruits. Quinces are abundant in the Ambato market during the first few months of the year.

The quince is successfully cultivated in the Ecuadorian highlands, but it is nowhere a product of much commercial importance, though there are a few small commercial plantations near Ambato. Propagation is by means of cuttings and root-suckers.

Pyrus communis L.

Pera at Ambato and Cuenca, and in a few other regions of the highlands.

The cultivation in Ecuador of superior varieties of the pear dates from recent years. A small form, known as *pera nacional* or *pera común*, was probably introduced in colonial times, and is extensively cultivated in the vicinity of Ambato, whence the fruits are carried to Quito, Guayaquil, and many other cities. Propagation is by suckers, which spring up abundantly beneath the trees. The fruit is pyriform, 2.5 to 4 cm. long (occasionally larger), yellow and firm even when fully ripe. The flesh is white, rather mealy, not very juicy, and of a mild, pleasant flavor. Seeds are rarely produced.

Luis Cordero states that several European pears, such as Louise Bonne de Jersey, Duchesse d'Angouleme, and Beurre de Nantes, have been planted at Cuenca, but their cultivation in that region has not yet assumed commercial importance. At Ambato there are a number of varieties, known variously as *pera de manteca*, *pera de botella*, *pera de azúcar*, and so on, most of them being sold in the market under the name *pera de manteca*. There is no record of the introduction of these forms, and, although they are probably well-known European varieties, none of them has been identified with certainty. They are usually propagated by grafting on suckers of the *pera común*.

Malus baccata (L.) Moench.

Pyrus baccata L.

Manzanita de Chile at Ambato, where it is rarely grown, having been introduced only in recent years. As indicated by the common name, it probably came to Ecuador from Chile.

Two varieties of the crabapple have been seen at Ambato. One is broadly oval to spherical in form, about 4 cm. in length, the surface yellow, overspread on one side with orange-scarlet, and the flesh yellowish white. The other is oblate, about 4 cm. in diameter, the surface yellow, streaked and splashed with bright red on one side, the flesh pale yellowish white.

Malus sylvestris Mill.

Pyrus malus L.

Manzana throughout the country. The principal commercial centers of apple culture are at Ambato and Cuenca, but there are trees in many of the highland towns from Ibarra to Loja. In many places they are not very successful.

This fruit was probably introduced into Ecuador in colonial days, but it is only in recent years that good varieties have been planted. The types formerly grown, undoubtedly seedlings in many instances, are grouped together under the name *manzana común*, and yield small, hard fruits of inferior quality. The following three varieties are the best that are commercially cultivated.

Azotada. An apple much resembling Red Astrakhan. It is distinctly oblate in form, flattened, with a rather shallow cavity and rounded to broadly pointed at the apex, with a furrowed, moderately deep basin. The length of the fruit is about 5 cm., the breadth about 7.5 cm. The surface is somewhat irregular, the ground color light green or yellowish green, freely streaked and splashed with red, particularly toward the apex. The core is large and open, the flesh white, rather tough, very juicy, and of subacid flavor, the quality not above fair. It is used mainly as a cooking apple, and in the north would be classed as a cider apple. It ripens in February at Ambato, the season therefore being rather early. The origin of the variety is uncertain, but it has been cultivated at Ambato longer than any other named variety.

Balsosa. In form and quality this variety resembles Bellefleur. It is a large apple, often as much as 10 cm. in length, oblong to oval-conic, usually with three or four protuberances or bosses at the apical end. The cavity is rather deep and rounded, and the basin is deep, broad, and slightly furrowed. The surface is pale yellow, one cheek overspread with dull crimson-scarlet. The flesh is white, crisp, of firm texture, fairly juicy, and of mild, subacid flavor. For eating out of hand it is a fairly good fruit, when fully ripe. The season at Ambato is February and March. The origin of the variety is uncertain, but it has probably been brought to Ambato from Europe within the last 50 years.

Emilia. This is the best eating apple commercially grown in Ecuador at the present time, and the most highly esteemed in the markets, where it sells for two to four times the price brought by *Balsosa* and *Azotada*. It is oblate, flattened at both ends, and somewhat narrower at the apex than at the base. Commonly it is about 7.5 cm. in diameter, but occasionally it reaches 12.5 or even 15 cm. The cavity is

shallow and flaring, the basin broad, rather deep, and slightly fluted. The flesh is white, melting, very juicy, and of very pleasant flavor, with plenty of sweetness, a piquant taste, and a delicate aroma. The ripening season is slightly later than that of *Balsosa*. This variety was introduced from Europe in 1883 or 1884 by Don Emilio Teran; its correct varietal name has been lost, and it is now called *Emilia*, after the introducer.

Emilia and other varieties of apples (a few of North American origin have recently been planted in Ambato) are grafted on young plants of the *manzana común*, propagated as suckers from old trees. Nearly all of the apples (as well as peaches and pears) marketed in the Ambato region are picked too green. They are then brought into the public market place, roughly handled, pinched by all prospective purchasers, and perhaps kept until the bruised spots have all turned brown. As a result, it is difficult to obtain an apple, peach, or pear in prime condition for eating. Because of its greater value, more care is used in handling *Emilia*, however, and fruits of this variety can sometimes be purchased in good condition at Guayaquil and Quito.

Eriobotrya japonica (Thunb.) Lindl.

Níspero del Japón in the highlands, where it is occasionally seen in the gardens of Ibarra, Quito, Ambato, Cuenca, Loja, and other towns, but where it is not as yet much cultivated as a fruit-bearing tree. Also grown occasionally in the coastal lowlands. As an ornamental it is highly esteemed.

The climate of the highland towns is in many instances too cool for the loquat fruit to develop satisfactorily, but by planting the tree at elevations of 1,800 to 2,100 meters in regions with fairly dry climates better success would probably be obtained. However, no good varieties have as yet been introduced into Ecuador; the fruits produced by the seedlings cultivated in Loja, Cuenca, and elsewhere are small and sour.

The loquat is a tree reaching 6 to 7.5 meters in height, with elliptic-lanceolate, remotely toothed leaves 15 to 25 cm. long. The small white flowers, which are borne in woolly panicles 10 to 20 cm. long, are followed by yellow or orange fruits varying from globose to pyriform, 2.5 to 7.5 cm. long, with firm, juicy flesh enclosing one to several ovoid, light brown seeds about a centimeter long. In flavor the fruit suggests the cherry. The species is a native of eastern Asia.

Crataegus stipulosa (H. B. K.) Steud.

Huagra-manzana in the Province of Pichincha, where it is a common wild tree; *manzanita* in the Province of Azuay, where it is abundant in the region of Cuenca.

The plant, which grows wild along some of the inter-Andean ravines and is also cultivated in several regions, becomes a slender tree, usually not more than 6 meters high. It has elliptic-lanceolate leaves 5 to 7.5 cm. long, and produces during the months from March to May yellow globose fruits about 2.5 cm. in diameter. These are identical in character with the *tejocotes* of Mexico and the *manzanilla* of Guatemala. The flesh is whitish, mealy, and rather dry, and of pleasant flavor, suggesting that of the apple; the seeds are large and rough on the surface. The fruits are often sold in the markets of Quito and Cuenca.

ROSACEAE.

Fragaria chiloensis (L.) Duchesne. PLATES 36, 37.

Frutilla at Ambato; *fresa* in Imbabura Province, where a few plants are to be seen at Otavalo and at the Hacienda Cusin. Luis Cordero says, regarding its occurrence in the southern provinces of Azuay and Cañar: "It is cultivated in a few gardens, though it does not fruit so well as in the sandy regions of Tungurahua Province." That it has been cultivated at Ambato since a remote day is evidenced by the following passage, taken from Padre Velasco: "*Frutilla*, erroneously so-called, is the strawberry of Quito, since it is so large that one fruit is equal to two or three of the

European. It bears every day in the year, and although it is common in several Provinces in no other is it produced in such abundance and perfection as in that of Tungurahua."

This remarkable fruit more recently attracted the attention of Robert Spruce, the English naturalist, who wrote: "In the equatorial Andes the Province of Ambato is famed for its strawberries, which equal in size and flavor some of our best varieties, and are to be seen exposed for sale in the market place of Ambato every day in the year. They are cultivated at an altitude of from 2,100 to 2,700 meters, but the best are grown a little way out of Ambato, as you go towards Guayaquil, on the slopes of Guachi (lat. 1¼ deg. S.) at near 2,700 meters, and in a mean temperature of 60°, where, however, the thermometer does sometimes descend, perhaps half a dozen times in the year, to the freezing point in the early morning, but scarcely ever on two successive days."

It is only in the region of Guachi that this species is commercially cultivated in Ecuador. This settlement, distant about 8 kilometers from Ambato, lies at an altitude varying from 2,900 to 3,000 meters, and is a series of rolling hills, almost devoid of trees, with a soil which can be characterized as a very loose, fine, sandy loam of volcanic origin. The strawberry plantations cover an area of at least 60 acres. The plants are never irrigated, and the rainfall here is probably not more than 40 cm. per annum. Three times a year the fields are cleaned of weeds with a heavy hoe, this being the only cultural attention they receive. The plants do not grow to large size. When irrigated they make luxuriant growth, but do not yield abundantly nor is the fruit large or sweet. The fruit is picked once a week throughout the year. There are, however, three seasons when the most abundant yield is obtained, these being in February, in August, and in December. The method of handling the fruit is primitive; it is carried to Ambato in kerosene boxes, holding about 12 to 15 kilograms; and is there sorted and packed in baskets for shipment by train to Quito and Guayaquil.

In form this strawberry is less variable than most of the varieties grown in the United States. It is oblong-conical in outline, sometimes oblong-ovoid, and from 2.5 to 5 cm. in length. When fully ripe it is light red, with the flesh pinkish white, meaty, juicy, and of mild, sweet flavor. In quality the fruit is not so good as the finest North American and European strawberries, but it can be shipped much more successfully than the latter, because of its firm texture.[2]

Fragaria vesca L.

Fresa in the southern provinces, and as far north as Quito; *frutilla* in Imbabura Province. It grows wild upon the mountain sides between 2,100 and 3,000 meters altitude at various places in Loja and Tungurahua provinces, and probably elsewhere. It is occasionally cultivated in gardens throughout the inter-Andean region.

This species is believed to have come to Ecuador from Europe, probably along with the seed of barley or some other European grain. It has, however, assumed the appearance of an indigenous plant in several parts of the Republic and still more noticeably so in the Department of Cundinamarca, Colombia. In Ecuador the fruit is not esteemed and is, in fact, rarely used, the species being cultivated in gardens more as an ornamental than as a fruit-bearing plant. In Colombia, however, the fruit is much liked, and is commonly sold in the markets of Bogotá. The largest specimens are about a centimeter in length, broadly oval to round, bright red, of delicate texture and aromatic flavor, though sometimes possessing an unpleasant bitterness. When cooked they yield an excellent preserve, and it is in this form that they are most commonly served in Bogotá.

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[2] For a more extensive treatment of this species see Wilson Popenoe, The Frutilla, or Chilean Strawberry, Journal of Heredity, **12**: 457–466. 1921.

Rubus glaucus Benth. PLATE 38.

Mora de Castilla at Ambato, where it is cultivated commercially on a small scale; at Quito, where it is not common; at Otavalo, where it is found in many gardens, this town being famous for its *moras*; at Ibarra, where it is fairly abundant; and in several other highland towns, at altitudes between 2,100 and 3,000 meters.

This excellent fruit,[3] native to the mountainous regions of Ecuador (as well as several other tropical American countries), has received a certain amount of cultural attention in several parts of the country, with the result that horticultural varieties have originated. At Ambato there are two—one, the common sort, with dark maroon-colored fruits, and the other with light-red fruits, somewhat more delicate in flavor than the common form. The plant is half-climbing in habit, and a vigorous grower. It covers arbors and fences, or can be trained to bush form, making a clump 3 meters in diameter and about 3 meters high. The stems are round, and covered with a thick whitish bloom; the leaves are trifoliolate, with the leaflets ovate-lanceolate, long-acuminate, serrate, about 7.5 cm. in length, light green above and glaucous beneath. The flowers are produced in terminal racemes sometimes 30 cm. in length; they are white, and nearly 2.5 cm. in diameter. The fruits are oblong to oblong-oval in outline, often more than 2.5 cm. in length, composed of a large number of small drupelets closely set together. The seeds are not so large as to be troublesome in eating the fruit. The flavor resembles that of some of the northern raspberries. It is rich, aromatic, pleasantly subacid, and very agreeable when the fruit is fully ripe. Although excellent when eaten with sugar and cream, the fruit of this species is more commonly used in Ecuador to prepare a sweet conserve or a syrup made in Otavalo, called *jarope de mora*, from which a *refresco* is made.

Rubus adenotrichos Schlecht. PLATE 39.

Mora and *mora común* in central and northern Ecuador, where it is a common wild plant at elevations between 2,300 and 3,700 meters.

This is a very vigorous plant, forming large clumps up to 5 or 5.5 meters high, the stout canes thickly furnished with short, stiff, maroon-colored hairs. The leaflets are ovate-acuminate to oblong-acuminate, finely serrate, 7.5 to 10 cm. long. The white flowers are produced in large loose panicles sometimes more than 30 cm. in length, and are followed by an abundance of ovoid, deep purple fruits commonly about 2 cm. long. The drupelets are numerous and crowded closely together; the seeds are moderately large, but not very troublesome when the fruit is eaten. The flavor is practically the same as that of the cultivated blackberry of the North, and the quality is good. Because of its productiveness and the excellent quality and flavor of its fruit this species seems worthy of horticultural attention.

An albino form was collected at La Rinconada, in the Province of Carchi, where it is known as *mora blanca*. This is somewhat less robust than the typical form of the species. The fruits differ only in color and flavor, being cream-yellow and sweet.

Rubus floribundus H. B. K.

Mora in the Provinces of Azuay, Cañar, and Loja, where it appears to be indigenous. Luis Cordero, who incorrectly identifies this as *Rubus fruticosus*, says of it: "This is the common *mora*, abundant in the hedges which surround our farms and in many other situations throughout the region of mild climate. It is also called *zarzamora*. It produces very good fruits, and is the great protector of our cultivated fields, because of its profusion of intertwined stems, and more particularly because of the sharpness of its thorns."

This species reaches about 4.5 meters in height, and is half-shrubby. The canes are somewhat angular in cross section, finely pubescent, and light green. The leaves are composed of five oblong-elliptic, acuminate, finely serrate leaflets, very sparsely

[3] See Wilson Popenoe, The Andes Berry, Journal of Heredity, **12**: 387–393. 1921.

pubescent on the lower surface and glabrate above. The flowers are white to light pink, nearly 2.5 cm. broad, and are produced in stiff terminal racemes up to 30 cm. long. The fruit is a blackberry of oblong-oval form, about 2 cm. long, the drupelets rather small and closely crowded together. The seeds are not unduly large nor hard, and the fruit is, on the whole, one of very fair quality. It is not much used.

Rubus roseus Poir. PLATE 40.

Huagra-mora upon the slopes of the Volcano Tungurahua, where it occurs abundantly as a wild plant at altitudes of 2,700 to 3,700 meters; *mora de rocoto* in the Province of Carchi, where it is found at altitudes of 3,000 to 3,700 meters. It also occurs in the Province of Loja, at about 2,700 meters altitude, in the Cordillera de Zamora.

The plant is not a large grower. It forms clumps about 1.5 meters high, or sometimes scrambles over other plants, its canes reaching 2.5 meters in length. The leavee are trifoliolate, with glossy, oval to oblong-acute, serrate leaflets, often having a maroon tinge. The rosy purple flowers, about 4 cm. broad, are borne in clusters of only a few; they are followed by oval or conical fruits 2.5 to 4 cm. long, crimson, juicy, and of pleasant flavor. The seeds are not objectionably large nor hard. The individual drupelets of which each fruit is formed are medium sized—about like those of the cultivated raspberries, which the species also suggests in flavor and general character of fruit. The plant is not very productive.

Rubus urticaefolius Poir.

Mora, the common wild blackberry of Baños, Tungurahua Province, where it grows abundantly along roadsides, in fences, and about cultivated places. The plant is rather conspicuous because of the whitish undersurface of the leaves.

This species is a fairly strong grower, sending up canes to a length of 3 or 3.5 meters. It is half-climbing in habit. The leaves are palmately compound, the leaflets ovate-acute, very finely serrate, sparsely hairy above, velvety-pubescent and glaucous below. The racemes are slender, commonly 10 to 20 cm. in length, and the flowers are small and white. The fruits also are small, being rarely more than 6 mm. long; they are broadly oval, each composed of numerous very small drupelets, the seeds soft. The berries are sweet and of very agreeable flavor, but their small size is against them and they are little used by the people of Baños.

AMYGDALACEAE.

Prunus serotina Ehrh. PLATE 41.

Capuli throughout the highlands, where it is much more abundant in some sections than in others. Beginning in the north, it is frequent in the Provine of Carchi, but not really abundant. The same is true of the Ibarra section. Toward Otavalo it occurs in greater profusion, and around the shores of Lake San Pablo it is very abundant. In Pichincha Province it is, again, less conspicuous, though not by any means wanting. From Latacunga to Riobamba it is one of the few trees that grow upon the sandy plains, and it here attains greater economic importance, perhaps, than in any other portion of the Republic. In the Azuay, however, it is nearly as abundant and important, and in certain parts of this province, as in that of Cañar, it assumes an indigenous appearance. In Loja it is not rare, but is not sufficiently common to play a very important rôle in the life of the people. Its range in general is between 1,800 and 3,400 meters elevation.

It has generally been considered by botanists that this species is indigenous in Ecuador, but there is little evidence to substantiate this belief. It is thoroughly naturalized in several regions, but it is known in all of them under a name taken from the Nahuatl tongue of Mexico; and history records its introduction from Mexico into other parts of South America after the Conquest. It is most probable that the species was not known south of Central America in pre-Columbian times.

The *capulí* is a stout tree up to 12 or 14 meters in height, with oblong-lanceolate to lanceolate, finely serrate leaves from 7.5 to 12.5 cm. long. The flowers, which are produced in slender racemes 7.5 to 20 cm. long, are white, and about 2 cm. broad. The fruits resemble the European cherry in appearance; they are oblate or nearly spherical, 1 to 2 cm. in diameter, deep purplish maroon when fully ripe, with a thin, tender skin surrounding the greenish flesh and the single hard seed. The flavor and quality of the fruit, as also the size, vary greatly. As commonly seen, the *capulí* is not over a centimeter in diameter, and its flavor is slightly bitter. In several regions there are, however, superior forms that are worthy of vegetative propagation. Some of the best are those of Cuenca and Ambato. At Catiglata, near the latter town, there is a famous tree whose fruit is large, very juicy, and as sweet and pleasant as the best European cherries.

The botany of this interesting and valuable fruit tree has long been in confusion. Recently Blake[4] has gone over the material available in the herbaria at Washington and has reached the conclusion that the *capulí* or *capulín*, grown from Mexico to Peru and Chile, is a cultivated southern form of the northern black cherry, *Prunus serotina* Ehrh., which occurs as a wild plant from Nova Scotia to Mexico. Other botanists have considered it to be distinct, and it is often mentioned in literature under the name *Prunus salicifolia* H. B. K. or *Prunus capuli* Cav.

Prunus cerasifera myrobalana (L.) C. Schneid.

Mirabel at Ambato, where it is more extensively grown than any other species of plum, though it will probably be supplanted in the near future by better ones. Elsewhere in Ecuador it is seen very rarely.

The myrobalan plum was brought from Europe in early colonial days, and is successful under the conditions obtaining in the region of Ambato. The trees grow to large size and produce their popular fruits in great abundance. Propagation is mostly by suckers, less commonly by seed, and rarely by cuttings. The species is often used as a stock plant on which to graft the so-called Reina Claudia plum.

The fruit, which ripens in December and January, earlier than that of the other plums now cultivated in the Ambato region, is round to broadly oval in outline, up to 2.5 cm. in length, bright red when fully ripe, with soft, juicy flesh of pleasant flavor, but is inferior in quality to that of the grafted varieties now being planted.

Prunus armeniaca L.

Albaricoque in those parts of the country where it is known. The apricot is cultivated commercially in two regions, at Ambato and in the vicinity of Cuenca. Regarding its behavior in this latter region, Luis Cordero says: "This handsome fruit tree succeeds perfectly in our haciendas of rather warm climate, especially in the fertile and beautiful valleys of Paute and Gualaceo. Rare is the year in which the fruit is not abundant, and for this reason the well-known boxes of apricots preserved in syrup, so highly esteemed in other parts of the country, are never wanting." Outside the Cuenca and Ambato règions, there are occasional trees to be seen at Loja and northward in Imbabura Province.

The ripening season at Ambato is in January and February. Propagation is commonly by seed, and occasionly by grafting on peach, apricot, and plum. The varieties grown in Ecuador—mostly seedling forms—are almost invariably small-fruited and considerably inferior to the best North American and European apricots.

Prunus spp.

Ciruela, of which several forms are cultivated commercially in the vicinity of Ambato. Elsewhere in the highlands they are seen occasionally, as at Otavalo and especially in the region of Cuenca.

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[4] See Popenoe and Pachano, The Capulin Cherry, Journal of Heredity, **13**: 51–62. 1922.

The variety called the *Reina Claudia* at Ambato is properly the Chabot or Bailey plum (*P. salicina* Lindl.) of the United States, according to Professor Pachano, who states that it was introduced into Ecuador about 15 years ago. Its cultivation is assuming commercial importance very rapidly, the fruits meeting a ready sale at excellent prices. The variety is propagated by grafting on peach, on *mirabel*, and sometimes on the Damasco plum.

The variety Wickson (*P. salicina* × *simonii*), introduced in recent years by the Quinta Normal de Agricultura at Ambato, is also becoming popular in Tungurahua Province, where it produces its excellent fruits in abundance. The tree has not proved to be a strong grower, however.

The *ciruela morada* or *damasco* of Ambato, doubtless introduced in colonial times, is a slender, compressed, very sweet fruit, probably of the Damson group, *Prunus domestica institita* L. It is propagated by suckers.

Amygdalus persica L.

Prunus persica Stokes.

Durazno in all parts of the country where it is cultivated, though this name is properly limited to the clingstone varieties; the freestones are variously called *guaytambo*, *melocotón*, *abridor*, and *prisco*.

Among the fruits brought by the Spaniards to the inter-Andean region of Ecuador, the peach is to-day the most extensively cultivated. It is especially abundant in the Provinces of Tungurahua and the Azuay, where there are many seedling forms of excellent quality. In all Provinces of the Sierra it is cultivated more or less commonly, its approximate range being from 1,500 to 3,000 meters.

Since about 40 years ago, grafting has been practiced at Ambato. The forms now cultivated in that region, according to Professor Pachano, may be classified as follows:

Duraznos (true peaches):

1. Duraznos (clingstones); white-fleshed (termed "de leche"), yellow-fleshed, and red-fleshed (termed "sanguineos").
2. Abridores (freestones); white-fleshed, yellow-fleshed, and reddish-fleshed.

Peladillos (nectarines):

1. Clingstones (peladillos).
2. Freestones (nectarines).

The clingstone *duraznos* of Ambato are sometimes of good size, attaining 7.5 cm. in length. As a general rule they have rather hard flesh, and are better for cooking or preserving than for eating out of hand. For the latter purpose some of the small white freestones are excellent. These are commonly from 5 to 6.5 cm. in length, with milk white flesh of delicate texture and aromatic flavor.

Since peaches are commonly propagated by seed at Ambato (as well as elsewhere in Ecuador), there are practically as many varieties as there are trees. An occasional one is good enough to merit vegetative propagation.

The clingstone forms are the commonest in all parts of the country. At Ibarra and elsewhere in northern Ecuador freestones are practically unknown. The same is true of Loja Province. Some of the seedlings grown near Gualaceo, in the Azuay, are of excellent quality. Luis Cordero says of the peach in Azuay and Cañar, "It is profusely cultivated in all our regions of moderate temperature, since its fruit is among the most highly appreciated in the markets. We possess several varieties, the best being the *prisco* and the *abridores*."

While the cultivation of the peach, like that of most other fruits, has not yet received scientific study in Ecuador (with the exception of a few instances), there is no doubt that it is capable of forming the basis of a considerable and profitable industry. Besides large areas of land suitable for the production of good peaches, Ecuador possesses good seedling varieties, especially valuable because better adapted to the

peculiarities of the climate than are forms introduced from abroad. It would not be difficult to search out some of these seedlings and establish them, by means of vegetative propagation, as named varieties. This will have to be done, and more care will have to be given to marketing the fruit than at present, before peach culture in Ecuador will be put upon a really profitable basis.

Amygdalus communis L.

Prunus amygdalus Stokes.

Almendra, in the provinces of Azuay, Cañar, Tungurahua, and Pichincha, where occasional trees are to be seen.

There are a number of almond trees in Ambato, but they do not bear regularly or abundantly. Luis Cordero says of its behavior in the region of Cuenca: "There are people who cultivate it, and who have obtained a few almonds, but it has never become widely distributed, in spite of its manifest usefulness; for, while it flowers profusely, it appears that fertilization is not satisfactorily accomplished, and most of the flowers fall to the ground without setting fruits." While Cordero is probably not correct in considering the failure of this species to be due to defective pollination, it is evident that the tree does not find its environment congenial, and there are no facts to warrant the belief that almond culture can ever become commercially important in Ecuador.

MIMOSACEAE.

Inga spp.

Guaba or *huaba* in many highland towns of moderate elevation, such as Ibarra (2,200 meters), Ambato (2,600 meters), Cuenca (2,600 meters), and Loja (2,200 meters).

Trees reaching about 9 meters in height, with pinnate leaves 20 to 30 cm. long, and small white flowers in axillary clusters. The fruits are flattened pods up to 15 cm. long. They contain several large seeds surrounded by white, translucent, jelly-like pulp of a sweet, perfumed taste, much liked by Ecuadorians of all classes.

Numerous species, both wild and cultivated, are found from sea level up to 1,800 or 2,100 meters elevation, and under cultivation they sometimes ascend to 2,700 meters. Various common names, such as *guaba de bejuco*, *guaba de mono*, and *guaba machetona* are applied to them; the Quichua name is *pacay*. The genus is a difficult one, some of the Ecuadorian species probably being as yet undescribed.

CAESALPINIACEAE.

Tamarindus indica L.

Tamarindo on the coastal lowlands, where it is a common tree. It is rarely seen at elevations higher than 1,200 meters.

The tamarind, a handsome tree which reaches 18 meters in height, has pale green, abruptly pinnate leaves composed of 10 to 20 pairs of obtuse oblong leaflets, each about a centimeter long. The pale yellow flowers, borne in small lax racemes, are about 2.5 cm. broad, and are followed by flattened cinnamon-brown pods, 7.5 to 20 cm. long. These have a thin, brittle outer shell, within which are the brown, acid pulp and several obovate, flattened seeds. Although considered indigenous in tropical Africa, the tamarind has long been cultivated throughout the Tropics. Its fruit is used to prepare refreshing drinks and to season food.

OXALIDACEAE.

Averrhoa carambola L.

Carambola; cultivated at the Hacienda Payo (near Naranjito, in Guayas Province), which is probably the only place in Ecuador where it has been planted. It succeeds well under the conditions of climate and soil which obtain in the Ecuadorian lowlands.

This Asiatic fruit tree, which grows to a height of 9 meters, has compound leaves with two to five pairs of ovate or ovate-lanceolate leaflets, 4 to 7.5 cm. long, light green and glabrous above, glaucous beneath. The small white or purplish flowers are borne in small racemes from both the young and old branches. The fruit is oval or elliptic in outline, translucent yellow or pale golden brown in color, 7.5 to 12.5 cm. long, and 3, 4, or 5-ribbed longitudinally, so that a cross section is star-shaped. It contains a clear watery pulp, astringent when green and tasting like green gooseberries, but pleasantly acid when ripe, with an aroma suggesting that of the quince. The seeds are small and very few, or sometimes wanting altogether. The fruit is sometimes eaten out of hand, but more often is prepared in conjunction with meats or other food.

RUTACEAE.

Citrus sinensis (L.) Osbeck.

Naranja dulce; cultivated principally in the coastal lowlands and in the warm valleys of the inter-Andean region, such as those of Guaillabamba and Chota. It is occasionally seen at Ambato (2,600 meters), but the fruit there produced is not of good quality. At Ibarra, also, it is occasionally cultivated, though the fruits are not so sweet as those of lower elevations. Some of the best oranges grown in the highlands are found in the Guaillabamba Valley. The product of the region along the river Daule, in Guayas Province, is famous for its quality. The oranges of the coast are in general sweeter than those of the highlands, but not so richly flavored.

The orange is one of the important fruits of Ecuador. The trees are nearly all seedlings, there being only a few grafted specimens, introduced in recent years. The product is of about the same quality as that of other Latin-American countries, in many of which the orange is one of the most popular of fruits. In size and general character the best Ecuadorian oranges resemble the Valencia or Hart's Late of the United States; but they usually have more seeds, and the "rag" is more troublesome in eating the fruit.

Citrus nobilis deliciosa (Ten.) Swingle.

Mandarina throughout the country. At Ambato the mandarin orange is the most successful of the citrus family. It is fairly common in the better gardens of the town, and the fruit appears in the market, often, however, from haciendas farther down the river. The tree remains small, due to the cool climate of this region, and the fruits are scarcely as large as a good Dancy tangerine; commonly they are about 5 cm. in diameter, with thin skin, rather tough and abundant "rag," and numerous seeds, but the flesh contains abundant juice of rich flavor. At Ibarra it is occasionally seen, but it is not a common fruit in this region; the same is true of Cuenca and Loja, in southern Ecuador. On the coast it is cultivated successfully, though to a limited extent.

Citrus aurantifolia (Christm.) Swingle.

Limón sutil in the lowlands, and in the warmer inter-Andean valleys, up to elevations of about 1,800 meters. This, the sour lime of English-speaking countries, replaces the lemon in Ecuador, just as it does in tropical America generally. It is used extensively for the preparation of refreshing drinks, and in cookery.

Citrus aurantium L.

Naranja agria in the vicinity of Ambato, at Ibarra, and commonly throughout the lowland region of the Republic.

The sour orange is sometimes employed as a stock plant on which to graft sweet oranges, though propagation by this means is not extensively practiced in Ecuador. Its fruits, which are the size of ordinary sweet oranges, have a sour and bitter taste and are not highly esteemed. They have various culinary uses, but can scarcely be eaten out of hand.

Citrus grandis (L) Osbeck.

Toronja, on the littoral, and occasionally in the warm inter-Andean valleys up to elevations of about 1,500 meters.

Good varieties of the grapefruit are scarce in Ecuador. The seedling forms known under the name *toronja* are comparable to the shaddocks of the West Indies, and are little esteemed. They are used principally for the preparation of sweetmeats, and trees are rarely seen in any part of the Republic.

Citrus limetta Risso.

Lima in the valleys of Guaillabamba and Chota, and elsewhere throughout the Republic up to elevations of about 2,000 meters. Occasional trees are seen at Ambato, Otavalo, and Ibarra.

The sweet lime, popular thoughout most parts of tropical America, resembles an oblate lemon in appearance, and has very juicy flesh of a sweet and somewhat insipid flavor. It is considered refreshing in hot climates, and is relished in the same manner as is the orange in the United States.

Citrus limonia Osbeck.

Limón real; occasionally seen in gardens at Ambato, Otavalo, Ibarra, and elsewhere in the highlands, and on the coast. Nowhere in Ecuador is it a fruit of any economic importance.

The true lemon, highly esteemed in southern Europe and in the United States, does not usually produce fruits of excellent quality in tropical America. In all this region its place is filled by the sour lime (*C. aurantifolia*).

Citrus medica L.

Cidra; occasional in gardens near Ambato, Ibarra, and elsewhere. The citron is rarely seen in Ecuador, and its fruit is not much used.

MALPIGHIACEAE.

Bunchosia armeniaca (Cav.) DC.

Ciruela verde and *ciruela silvestre*, throughout the inter-Andean region, at elevations of approximately 1,500 to 2,400 meters. The plant is considered to be indigenous in the Pastaza Valley below Baños. It is commonly cultivated in the latter town (elevation 1,800 meters), and is occasionally seen in the gardens of Ambato, but the climate of the latter region is slightly too cool for it. At Loja it is well known, as also at Ibarra and Otavalo, Province of Imbabura. As a fruit-bearing plant, however, it is nowhere esteemed very highly, and it possesses no commercial importance.

This handsome species attains a maximum height of about 4.5 meters and is therefore an arborescent shrub rather than a tree. The glossy, deep green leaves are elliptic-acuminate and 7.5 to 15 cm. long; the small yellow flowers are produced in short axillary racemes. The light green fruits are round or nearly so, 2.5 to 4 cm. in diameter. Within the thin, delicate skin is a mass of cream-colored, very sweet pulp, in which are embedded one or two large seeds. The flavor is rather cloying, and the pulp not very abundant.

ANACARDIACEAE.

Mangifera indica L.

Mango in all those sections of the Republic where it is grown. On the coast it is one of the commonest fruit trees; in the highlands it is rarely seen, but is said to be grown in the Yunguilla Valley, near Cuenca, and in a few other places. It is not successfully cultivated at elevations greater than 2,000 or 2,100 meters.

This well-known Indian fruit tree, doubtless introduced into Ecuador during colonial times, is represented only by inferior seedling forms similar to those of most

other tropical American countries. Grafted mangos have probably not been produced in Ecuador as yet, with the exception of a few at the Hacienda Payo, near Naranjito, in the Province of Guayas.

Anacardium occidentale L.

Marañón on the coast, where it is fairly well known, though not so abundant as in many parts of Central America and the West Indies.

The *marañón*, in English commonly termed cashew, is a native of tropical America. The tree is somewhat spreading in habit, and reaches a height of 6 to 9 meters. The young growth has an attractive reddish color; the leaves are oblong, 10 to 15 cm. in length; the flowers small, pinkish, and produced in large terminal racemes. The fruit (usually termed the cashew nut) is kidney-shaped, about 2.5 cm. long, and attached to the end of the fleshy peduncle (termed cashew apple), which is 5 to 7.5 cm. long, yellow or bright red in color, very juicy, and of strongly aromatic odor and flavor. Both the fleshy peduncle and the nut or true fruit are eaten, the latter only after roasting to remove the caustic and volatile oil which it contains.

Spondias cytherea Sonner.

Spondias dulcis Forst.

Manzana de oro (from the West Indian name, golden apple) in the Province of Guayas, where there are a few trees. The fruit is not known in the markets of the Republic.

The tree is erect, stately, up to 18 meters in height, with compound leaves 20 to 30 cm. long, composed of 11 to 23 oval to oblong, remotely serrate, acuminate leaflets about 7.5 cm. in length. The small whitish flowers are produced in loose panicles 20 to 30 cm. long. The fruit is oval to obovoid, 5 to 7.5 cm. long, orange-yellow, with a thin but tough skin, yellow, juicy flesh, and a large oval seed covered with stiff spines or bristles. The flavor of the fruit suggests that of the apple, but is sometimes unpleasantly resinous or pungent. This species, native to some of the islands of Oceania, is widely cultivated throughout the Tropics.

Spondias mombin L.

Spondias lutea L.

Jobo (sometimes *hobo*) and *ciruela amarilla* in the coastal lowlands, where it is abundant. Its fruit is not much used.

The *jobo* is a tall, stately tree, sometimes attaining 15 meters in height. The leaves are 20 to 30 cm. long, and composed of 7 to 17 ovate-lanceolate, serrulate leaflets about 7.5 to 10 cm. in length. The yellowish white flowers are borne in loose panicles 15 to 30 cm. long, and are followed by clusters of ovoid, bright yellow fruits, each about 2.5 cm. in length, with a thin skin, soft juicy flesh, and a large rough stone. The flavor is rather pungent, for which reason the fruit is not liked by everyone. It is eaten out of hand.

Spondias purpurea L.

Ciruela and *ciruela colorada* in the Province of Guayas and elsewhere in the coastal lowlands, where it is a common tree; *hobo* in the Chota Valley of northern Ecuador, where it is cultivated on a very limited scale. It grows readily from large cuttings, which may be put in as fence posts. For this reason it is much used to form hedges and fences.

The tree is small, often spreading in habit, and reaches a maximum height of about 7.5 meters. The leaves are 12 to 20 cm. long, composed of 16 to 21 oblong-elliptic, oblique, subserrate leaflets about 2.5 cm. in length. The purplish maroon flowers are produced in small unbranched panicles commonly under 2.5 cm. long. The fruits, borne singly or in clusters of two or three, are oval to round, from 2.5 to 5 cm. in length, yellow to deep red, with a thin but tough skin surrounding yellow, juicy flesh and a rough, oblong, hard seed, usually more than a centimeter long.

The species is a native of tropical America. The fruit, which is often seen in the markets, is usually eaten out of hand.

SAPINDACEAE.

Melicoccus bijugatus Jacq.

Melicocca bijuga L.

Mamoncillo; cultivated at the Hacienda Payo, near Naranjito, in Guayas Province. Not noted elsewhere in Ecuador, though it is adapted to cultivation throughout the coastal lowlands.

The tree, which grows slowly, is erect, shapely, and 9 to 12 meters high. The leaves are compound, with two pairs of elliptic-lanceolate, acute, glabrous leaflets, the lower pair about half the size of the upper. The small flowers, which are produced in short panicles, are followed by clusters of smooth round fruits the size of plums. The outer covering of these fruits is thick and leathery, and green on the surface; it incloses a large round seed surrounded by soft, yellowish, translucent, juicy pulp. The flavor is sometimes sweet and pleasant, again rather acid, especially if the fruit is not fully ripe. The native home of the *mamoncillo* is in northern South America.

Litchi chinensis Sonner.

Nephelium litchi Cambess.

Lychee, at the Hacienda Payo (near Naranjito, Province of Guayas), which is probably the only place in Ecuador where it has been cultivated.

The lychee, one of the most valuable of Asiatic fruits, is produced by a tree 7.5 to 10 meters in height, with compound leaves formed of two to four pairs of elliptic-oblong to lanceolate, sharply acute, glabrous leaflets 5 to 7.5 cm. long. The flowers are small and unattractive and are borne in terminal panicles sometimes 30 cm. in length. The fruits are borne in loose clusters of 2 or 3 to 20, and are oval to ovate in form, about 3 cm. in diameter, with a hard, brittle outer covering which is rough and divided into scalelike areas on the surface. Within is the white, translucent, firm and juicy flesh, inclosing a single round, glossy seed the size of a large bean. The flavor is subacid, somewhat suggestive of the sweet cherry. While the lychee has not yet fruited at Payo, there are two trees of fruiting size at that place, and there is little doubt that the climate and soil of the Ecuadorian lowlands are adapted to the successful cultivation of this species.

Nephelium lappaceum L.

Rambután at the Hacienda Payo, near Naranjito, in Guayas Province. It is probably not grown elsewhere in Ecuador at the present time.

This excellent Malayan fruit is produced by an erect, rather slender tree which reaches 9 or 10 meters in height. Its leaves are compound, with five to seven pairs of elliptic to oblong, glabrate leaflets about 10 cm. in length. The flowers are produced in loose axillary and terminal panicles, and are small, pubescent, and devoid of petals. The fruits are oval, about 5 cm. long, crimson, and covered with soft fleshy spines about a centimeter long. The outer covering is thin and leathery; when this is torn off, the white, translucent, juicy flesh is exposed. Within this is a large, oblong, somewhat flattened seed to which the flesh adheres closely. The rambutan is eaten out of hand, and its cultivation could be extended to advantage in Ecuador, since it seems to succeed admirably in the coastal lowlands.

Blighia sapida Koen.

Seso vegetal in Spanish, *akee* in English. This is an African plant, cultivated rather commonly in certain of the West Indian islands, but almost unknown in Ecuador. There are a few bearing trees in gardens and haciendas of the Province

of Guayas. This species is essentially tropical in its requirements, and probably will not succeed in Ecuador when planted at elevations greater than 1,500 meters.

The akee is an erect, handsome tree attaining 10 to 12 meters in height. The leaves are abruptly pinnate, with three to five pairs of obovate-oblong leaflets, the upper ones 10 to 15 cm. in length, the lower ones much shorter. The small flowers are borne in short axillary racemes. The fruit is a curious-looking capsule, about 7.5 cm. long, triangular in outline, and varying from straw-colored to magenta-red. When ripe it opens along three sutures, exposing three round, shining seeds with a whitish fleshy body at the base of each. This fleshy substance, which in appearance strikingly suggests the brain of a small animal, is firm and oily in texture, and is eaten when fried or cooked in some other manner.

VITACEAE.

Vitis vinifera L.

Uva throughout the sierra; it is grown mainly in the Malacatos Valley of Loja Province; in the Patate Valley of Tungurahua Province; and in the Chota Valley, which separates Imbabura and Carchi Provinces. All these regions have hot, dry climates and sandy soils favorable to the grape. They lie at elevations between 1,500 and 2,700 meters.

In colonial times the grape was cultivated by the Jesuits on their hacienda near Pimampiro, in the Chota Valley, and history records that a small quantity of wine was there manufactured. The varieties usually cultivated in Ecuador were introduced during the colonial period and are inferior in quality, being comparable to the Mission grape of California. In recent years more than 20 European varieties have been introduced from Chile by the Quinta Normal de Agricultura at Ambato, and it is probable that some of these will prove suited to the climate and soil of the Ecuadorian highlands, and will, at the same time, be of better quality than the varieties now cultivated. The greatest enemy of the grape in Ecuador is mildew; this often destroys the crop, and renders grape culture somewhat precarious in most parts of the country. Occasional grapevines are seen in many of the highland towns, but commercial plantations are limited to the regions mentioned.

BOMBACACEAE.

Matisia cordata Humb. & Bonpl.

Sapote in the provinces of the littoral, where it is a common fruit tree. It is abundant also in the Cauca and Magdalena Valleys of Colombia under this same name, the use of which has confused the species, in the minds of local botanists, with the sapote or zapote of Central America, *Calocarpum mammosum*.

This tree, which is cultivated from sea level up to elevations of about 1,200 meters, is erect in habit, and reaches an ultimate height of about 12 meters. Its leaves are cordate in outline, from 15 to 30 cm. in length, and are clustered toward the ends of the stiff branchlets. The short-stalked flowers, produced abundantly along the smaller branches, are cream-colored, about 2.5 cm. in length, with the stamens and pistil protruding conspicuously beyond the corolla. The fruit, which is about 10 cm. long, is elliptic and extended at the apical end to form a conspicuous rounded point. It is brownish green and pubescent, and has a thick leathery skin, within which are two or three seeds surrounded by soft orange-yellow flesh of sweet and pleasant taste.

Although this is one of the common fruit trees of the Ecuadorian lowlands, it is not well known in most other parts of tropical America. It can not be considered a fruit of great value.

CLUSIACEAE.

Mammea americana L.

Mamey de Cartagena, and occasionally *mata-serrano* in the provinces of the coast, where it is a rather common fruit tree.

The mamey, as it is termed in English as well as Spanish, is a handsome, erect tree reaching 18 meters in height. The leaves are oblong-obovate, 10 to 20 cm. long, thick, dark green, and glossy. The flowers, which are solitary or clustered in the axils of the young branches, are white and about 2.5 cm. broad. The fruit is round or oblate, 10 to 15 cm. in diameter, the rind russet-brown and nearly 3 mm. thick. The flesh, which commonly adheres closely to the one to four large seeds, is bright yellow and has a pleasant flavor suggestive of that of the apricot, for which reason the mamey is sometimes called "Santo Domingo apricot." It is not much esteemed for eating out of hand, but yields an excellent *dulce* or conserve. The species is considered to be native to the West Indies and northern South America.

Rheedia madruno (H. B. K.) Planch. & Triana.

Madroño, in the Province of Guayas (where it is a common garden tree) and probably elsewhere on the coast; it is also abundant in the Cauca Valley of Colombia, under the same common name.

This handsome tree is of erect, slender, pyramidal habit. It is conspicuous because of the deep green color of its foliage; the leaves are oblong-elliptic, shortly acuminate, 10 to 20 cm. long and 5 to 7.5 cm. broad, dark green above, somewhat lighter beneath. The small flowers are followed by yellow fruits 7.5 cm. long, oval to elliptic with a slender point at the apex, and tapering toward the stem; the surface is very rough, the skin thick and leathery, and the flesh whitish, translucent, juicy, and of a pleasant subacid, somewhat aromatic flavor. The seeds are large, oblong, and commonly two in number. The fruit, which is sometimes seen in the markets, is usually eaten out of hand.

Garcinia mangostana L.

Mangostán at the Hacienda Payo, near Naranjito, in Guayas Province, which is the only place in Ecuador where it is found, and probably the only spot in which this tree has been successfully grown on the west coast of South America.

The mangosteen, one of the finest fruits of the Asiatic tropics, is produced by a tree which reaches about 9 meters in height, and has elliptic, acuminate leaves, 15 to 25 cm. long, glossy, and of thick, leathery texture. The species is polygamous, staminate flowers and hermaphrodite or perfect flowers being produced separately upon the same tree. The red-purple fruit is about the size and shape of a mandarin orange, and has a large green calyx at its base. Within its thick, tough rind is a cavity in which lie four to eight snow-white segments of delicate pulp, having an acidulous, very agreeable flavor difficult of description. Many fruits are seedless; in others there are one or two oblong, flattened seeds. The ripening season at Payo is in April and May, with a few fruits remaining on the trees until July. There are a dozen fine trees at this place, all about 15 years old and in bearing. Because of its delicate root system, this is considered one of the most difficult to cultivate of all the tropical fruit trees. The behavior of the trees at Payo, however, proves that the species is well adapted to the Ecuadorian littoral region.

PASSIFLORACEAE.

Passiflora maliformis L.

Granadilla de hueso in northern Ecuador, where it is cultivated in the Valley of the Rio Chota; it is also known under this same name in the Cauca Valley of Colombia.

This is a vigorous climber much resembling the *granadilla de Quijos* in foliage, the light green leaves being ovate-cordate and about 7.5 cm. in length. The flowers

have a conspicuous whitish green calyx, and the corona is white, marked with purplish blue. The fruits are round, rarely more than 5 cm. in diameter, with a thin shell, yellowish green on the surface and whitish within. Though not 3 mm. thick, this shell is so hard that it is broken with difficulty. Within are the numerous small black seeds, surrounded by juicy pulp of pale, orange-yellow color and rather acid, highly aromatic flavor.

Passiflora popenovii Killip. PLATE 42.

Granadilla de Quijos on the eastern slopes of the Andes, where it is said to be indigenous as well as cultivated. It is a rare species, not seen in the highlands nor on the Pacific coast. Teodoro Wolf says of it: "From the mountains of Canelos the Indians bring to the markets of Baños and Riobamba a delicious fruit, called the *granadilla de Quijos*, which is the best of all the passifloras that grow in our territory." At Baños (Tungurahua Province, elevation 1,800 meters) it is now cultivated, though not abundantly.

The plant is a vigorous climber, with leaves 7.5 to 12.5 cm. long, ovate-elliptic and acuminate, glabrous, and light green. The flowers are produced in profusion upon slender peduncles arising from the leaf axils; the large calyx is deep rose-colored, while the remainder of the flower is white and purplish blue, the corona being marked with the latter color. The fragrance of the flowers is pronounced and agreeable. The fruit was described by Padre Velasco, in 1789, as follows: "It is larger and somewhat longer than that of *P. ligularis*, with a thick skin, not brittle, which is green on the surface and white within. The pulp which surrounds the seeds is sweet, of exquisite taste and delicious fragrance." Other species than the one here described are sometimes called *granadilla de Quijos* in various parts of Ecuador.

Passiflora quadrangularis L.

Badea in northern Ecuador, *tumbo* in the southern part of the Republic. It is cultivated abundantly in the coastal lowlands, and up to elevations of 1,800 meters. Above this it is rare but is found occasionally at elevations as high as that of Ibarra, 2,200 meters. It does not grow at Ambato, but is cultivated in the town of Loja, whose elevation is approximately the same as that of Ibarra.

The giant granadilla, as this plant is called in English, is the largest-fruited species of its genus. It is a coarse, strong climber, with four-angled stems and ovate or round-ovate, cordate leaves 15 to 20 cm. long. The flowers are white and purple, about 7 cm. in diameter, while the roughly oblong fruits are sometimes 30 cm. in length. The surface is dull yellow or orange-yellow, and the skin thin and delicate; within the latter is a zone of crisp, white flesh about 2.5 cm. in thickness, surrounding a cavity in which lie the numerous small, black seeds, each enveloped in whitish, translucent pulp. There is usually a quantity of juice within the cavity, and this, together with the pulp which surrounds the seeds, is used to prepare an excellent *refresco*.

Passiflora ligularis Juss. PLATE 43.

Granadilla throughout the country. It is cultivated mainly at elevations between 2,200 and 2,700 meters. At Ibarra it is quite successful, and it is fairly so at Otavalo (2,600 meters). At Ambato it is common, while close by, at Baños (1,800 meters), it has run wild. It is grown at Cuenca and also at Loja, and is, in fact, a common fruit in the markets of nearly all parts of the country, being carried to Guayaquil and other coast towns.

The plant is a vigorous climber, scrambling over trees and buildings of considerable size. The leaves are cordate, acuminate, and commonly about 15 cm. long. The flowers are solitary, 5 cm. broad, with the petals and sepals greenish, and the corona white with zones of red-purple. The fruit is oval or elliptic, 5 to 7.5 cm. long, orange-brown, with a thick, brittle shell enclosing small black seeds, each sur-

rounded by white, translucent, juicy pulp. The flavor is acidulous, and slightly perfumed. This species, a native of tropical America and known in English as "sweet granadilla," is one of the best of its genus.

Passiflora tripartita (Juss.) Poir.

Tacso at Baños, Tungurahua Province (elevation 1,800 meters), where it is occasionally seen in gardens, whence the fruit is sometimes carried to the market of Ambato.

This species is somewhat less vigorous in habit than *P. mollissima*, being a slender climber, reaching to 5 or 6 meters, with 3-lobed leaves 9 to 10 cm. long, the finely serrate lobes 7.5 to 9 cm. long by 1 to 2 cm. broad, glabrate above and sparsely and softly pubescent beneath. The light pink flowers are about 5 cm. broad, with a slender corolla tube about 10 cm. long. The fruit is oblong, tapering slightly toward the stem, about 7.5 cm. long, deep yellow when ripe, often blushed with red on one side. The small seeds are surrounded by deep orange-colored, juicy pulp very similar to that of *P. mollissima* in flavor and quality, and used in the same ways.

Passiflora psilantha (Sodiro) Killip.

Gullan in the vicinity of Cuenca (elevation 2,600 meters), where it is commonly cultivated in dooryards and gardens.

This species is very close to *P. mollissima*, from which it differs most conspicuously in the pubescence of the foliage. The plant is a vigorous climber, reaching to 6 or 7 meters. The leaves are 3-lobed, the lobes serrate, acute, 2.5 cm. or more in breath, glabrate above and sparsely hairy on the lower surface. The pink flower is 5 cm. broad, with a slender corolla tube about 10 cm. long. The fruit is similar to that of *P. mollissima*. There is a white-flowered form, occasionally seen in Cuenca.

Passiflora pinnatistipula Cav.

Tacso at El Angel, Province of Carchi (elevation 3,000 meters); also at Ambato, where it is common, but not so extensively cultivated as *P. mollissima*, nor is the fruit often sold in the market. In the Department of Cundinamarca, Colombia, it is known as *gulupa*.

This species is a strong climber of much the same habit as *P. mollissima*, from which, however, it can easily be distinguished in foliage, flowers, and fruit. The leaves are much more deeply lobed than those of the latter species, the lobes being nearly 7.5 cm. long by less than 2.5 cm. broad, and very sparsely serrate; they are dark green and glabrous on the upper surface, whitish and velvety-pubescent below. The flower is more attractive than that of *P. mollissima*, being of a deeper and livelier shade of pink; it has a corolla tube about 5 cm. long. The greenish yellow fruit is round, 5 cm. in diameter, with a somewhat brittle shell, and many seeds, each surrounded by translucent colorless pulp of sweet but rather insipid taste.

Passiflora mollissima (H. B. K.) Bailey. PLATE 44.

Tacso in northern and central Ecuador, where it is commonly cultivated, especially in the towns of Ambato and Ibarra. Its approximate range extends from 1,800 to 3,000 meters.

The plant is a vigorous climber, with 3-lobed leaves varying from 7.5 to 10 cm. in length, the finely serrate lobes 5 to 6 cm. long by 2.5 to 4 cm. broad, densely and finely pubescent above, and velvety-pubescent below. The handsome pink flowers, 5 to 7.5 cm. across, have a corolla tube 7.5 to 10 cm. in length; they are followed by cream-yellow, oblong, finely pubescent fruit, 7.5 to 12.5 cm. long. Within the thick, leathery skin are numerous small, elliptic, compressed, black seeds, each surrounded by deep orange-colored, juicy pulp of pungent subacid flavor. In the Department of Cundinamarca, Colombia, this species is very popular under the name *curuba de Castilla*. The fruits, in that country as well as in Ecuador, are commonly sold in the markets, and are eaten out of hand, or used to prepare refreshing drinks. They also make an excellent flavoring for ice cream.

Another species, *P. mixta* L. f., occurs wild throughout the highlands from Carchi to Loja. It is closely similar to *P. mollissima* in general appearance, but the fruits are not of such good quality as those of the last named. It is not seen in cultivation.

CARICACEAE.

Carica papaya L.

Papaya, in all parts of the Republic from sea level up to elevations of about 1,800 meters.

Excellent varieties of this well-known tropical fruit are cultivated in the Ecuadorian lowlands. Fruits 3 to 3.5 kilograms in weight are not uncommon, and the quality of some of them is superior to that of the papayas cultivated in many other countries.

Carica candamarcensis Hook. f. PLATE 45.

Chilhuacán in the gardens of Imbabura Province, where it is quite common; this name is used also at Quito, where the species is fairly well known. In Tungurahua Province it is termed *chamburo*, while in Azuay it is known as *siglolón*, *siglalón*, or *sigloalón*, and occasionally as *chiblacán;* in both these provinces it is abundantly cultivated. In Loja it is more frequently seen as a wild than as a cultivated plant, and is called *chamburo*. Its zone is approximately between 1,800 and 3,000 meters.

This species, which reaches a height of 4.5 to 6 meters, usually has a trunk stouter than that of the papaya, though the leaves strongly resemble those of the latter in size and character. It is irregularly dioecious, at least when brought under cultivation. At Ambato plants are seen bearing principally staminate flowers, but carrying at the same time a good number of fruits that are apparently normal in form and size. Many plants produce pistillate flowers only. The fruits, which are commonly sold in the markets of the inter-Andean region, are elliptic, sharply pointed at the apex, and deeply 5-sutured. By means of this last characteristic they can easily be distinguished from those of *C. chrysopetala*. They are deep orange when fully ripe, and possess a fragrance quite distinct from that of the papaya. The flesh is about a centimeter in thickness; it is usually eaten after cooking, being most popular in the form of a sweet conserve or *dulce*. The numerous seeds, quite distinct from those of the papaya in appearance, are embedded in a gelatinous, translucent, edible pulp which fills the central cavity of the fruit. The species is probably indigenous in the Andes of northern South America. In the vicinity of Bogotá, Colombia, it is abundantly cultivated, and it is seen also in numerous other parts of that republic.

Carica pentagona Heilborn. PLATE 46.

Babaco throughout the inter-Andean region, where it is cultivated in many places, from Loja Province northward to El Carchi. It was seen only in cultivation, between 1,800 and 3,000 meters altitude. Flowers other than purely pistillate ones have not been found on any of the numerous plants examined.

This is the most remarkable and valuable of the several interesting species of *Carica* cultivated in Ecuador. Because of its large fruits, from which an excellent sauce can be made, because of the relatively low temperatures which the plant can withstand, and because of its habit of producing seedless fruits, the *babaco* is worthy of attention in other countries. It is a smaller plant than *C. candamarcensis*, *C. chrysopetala*, and the papaya; it rarely reaches a greater height than 3 meters, and the stem is commonly rather slender, especially when the plants are set close together in commercial plantations, as is done at Ambato. The leaves are glabrous like those of *C. chrysopetala*, but with fewer and broader lobes. The fruits are commonly about 30 cm. in length, and 7.5 to 12.5 cm. in diameter; they are truncate at the base and sharply acute at the apex, resembling in form those of *C. chrysopetala*. Unlike the

latter, however, they are in transverse outline conspicuously 5-angled, with hollowed sides. The flesh is about a centimeter in thickness, nearly white, distinctly fragrant and very acid in flavor. It is eaten only after cooking. The large cavity in the center of the fruit contains a quantity of white, cottony substance and, occasionally, a few seeds. The latter are perhaps produced when the flowers are fertilized with pollen from other species of *Carica*.

The plant is propagated only by cuttings, and has not been observed in a wild state. It is said that its introduction into southern Ecuador (the Azuay and Loja) has been effected in recent years; plants are believed to have been carried to these regions from Ambato.

O. Heilborn [5] has published the only detailed treatment of Ecuadorian Caricas. In the paper cited he describes two new species, *C. chrysopetala* and *C. pentagona*, and treats also of *C. candamarcensis* and *C. papaya*. The genus *Carica* is a difficult one, not yet exhaustively studied, and there are probably numerous undescribed species still to be found in the Andes.

Carica chrysopetala Heilborn. PLATE 47.

Higacho at Baños, Province of Tungurahua, where it is common in gardens. It appears not to be grown in Ambato. In the Provinces of Pichincha and Imbabura it is called *chamburo*, and is fairly abundant in the larger towns such as Quito, Otavalo, and Ibarra. In the Azuay it is called *chamburo*, and in Loja *toronchi;* in the former province it is fairly abundant, but in the latter, with the exception of the northern portion, it is little known.

This plant is of about the same size as *C. candamarcensis*, and in general resembles the latter in appearance, though it can easily be distinguished by the leaves; those of *C. candamarcensis* are pubescent beneath, while those of *C. chrysopetala* are glabrous or nearly so on both surfaces. The fruits of the last-named are also quite distinct from those of *C. candamarcensis;* they are narrowly oblong, truncate at the base and acute at the apex, and commonly 10 to 15 cm. in length. When ripe, they are greenish yellow or deep yellow; the flesh is thin, even more aromatic than that of *C. candamarcensis*, and used only when cooked to form a *dulce* of pleasing aromatic flavor. The species is probably indigenous somewhere in the Ecuadorian Andes; it was not observed in Cundinamarca or elsewhere in central Colombia.

CACTACEAE.

Opuntia bonplandii Pfeiff.

Tuna; in dooryards and rocky waste places about towns and villages throughout the highlands.

With this species are often found other cacti native to Ecuador, and several that may have been introduced from other countries. *Opuntia dobbieana* Britt. & Rose, and *O. soederstromiana* Britt. & Rose are two native species, both of which yield fruits inferior in quality to those of *O. bonplandii*. All these species are called *tuna;* some have red fruits, others yellow. The better kinds are highly prized and often sold in the markets.

Hylocereus polyrhizus (Weber) Britt. & Rose.

Pitajaya or *pitahaya;* wild and half-cultivated in the lowlands along the littoral, where it climbs upon walls and trunks of trees, or scrambles over bushes and rocks.

This cactus, with slender 3-angled branches, yields a globular to oblong fruit 12.5 to 18 cm. in length, having a thick, red skin, bearing large leaflike scales. The pulp is white or sometimes pinkish, sweet, and pleasantly flavored. It is used in making *refrescos*, or eaten out of hand.

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[5] Arch. Bot. **17** [12]: 1–16. 1921.

MYRTACEAE.

Myrtus foliosa H. B. K.

Arrayán at Ibarra, Otavalo, Quito, Ambato, and in other towns of the highlands, between 2,100 and 3,000 meters elevation.

This plant, cultivated more as an ornamental than as a fruit-bearing tree, is erect, slender in habit, and ultimately about 6 meters high. The leaves are obovate, 1 to 2.5 cm. long, thick, glossy, deep green above and light green beneath. The flowers, which are produced singly or in clusters of two or three in the leaf axils, are white and about a centimeter broad. The fruit is broadly obovoid to spherical, dark purple, and crowned at the apex by the persistent calyx. It varies from 1 to 2.5 cm. in length, and is soft and delicate in texture; the thin skin is easily broken, exposing the whitish, juicy pulp that surrounds the single irregularly oval, compressed seed. The flavor is mildly subacid and pleasant, somewhat suggestive of that of the grape. The fruit is usually eaten out of hand.

Psidium friedrichsthalianum (Berg) Niedenzu.

Guayaba del Chocó in the Province of Guayas, where it is occasionally cultivated. A few specimens were seen in northern Ecuador, and many in the Cauca and Magdalena valleys of Colombia, where the species is called *guayaba agria*.

This guava reaches a height of about 7.5 meters, forming a small and attractive tree. The young branches are wiry, quadrangular, and reddish. The leaves are elliptic to oval, 5 to 10 cm. long, almost glossy on the upper surface and puberulent on the lower. The fragrant white flowers, produced singly on slender peduncles, are about 2.5 cm. broad. The few-seeded fruit is round or oval, 4 to 6 cm. long, sulphur-yellow, with soft white flesh of acid taste, lacking the musky odor which characterizes the common guava. It is too sour for eating out of hand, but is used in Costa Rica (where it is known as *cas*) to prepare a popular *refresco*, and it can also be used for jellies. The species is probably indigenous in Central America and the northern part of South America.

Psidium guajava L.

Guayaba throughout the country. It is one of the commonest fruit-bearing plants in nearly all regions lying between sea level and 2,300 meters elevation.

The common guava is an arborescent shrub or small tree, sometimes growing to 9 meters. The young branchlets are quadrangular, and the leaves oblong-elliptic to oval, 7.5 to 15 cm. long, finely pubescent beneath, with the venation conspicuously impressed on the upper surface. The white flowers, about 2.5 cm. broad, are solitary or several together upon a slender axillary peduncle. The fruit is round, ovoid, or pyriform, 2.5 to 10 cm. long, commonly yellow, with flesh varying from white to deep pink or salmon red. Numerous small hard seeds are embedded in the flesh toward the center of the fruit. The flavor is sweet, musky, and very distinctive. The fruit is eaten out of hand, or used to prepare various sorts of jellies and preserves. The native home of this species is tropical America.

Psidium guineense Swartz.

Guayabilla and *allpa guayaba* at Baños, Tungurahua (1,800 meters), where it is a common wild plant, growing along roadsides and in the edges of cultivated fields, in some places becoming a weed.

This species, of little economic value, is a slender shrub reaching 1 to 1.5 meters in height. The young branchlets are compressed-cylindrical and finely hairy. The leaves are oblong-oval, 7.5 to 12.5 cm. in length, with the lower surfaces pubescent. The flowers, of which one to three are borne upon a slender peduncle, resemble those of *P. guajava*. The fruit is round or nearly so, 2.5 to 4 cm. in diameter, greenish yellow and rather hard when ripe, with whitish flesh containing numerous small seeds. The flavor is rather acid and not so musky as that of *P. guajava*.

Caryophyllus jambos (L.) Stokes.

Eugenia jambos L.

Pomarosa in the coastal lowlands, and in numerous towns of the sierra which lie at elevations not exceeding 2,300 meters. It is esteemed more as an ornamental than as a fruit-bearing tree.

The rose-apple grows to 7.5 or 8 meters in height and is shapely and attractive in appearance. The leaves are oblong-lanceolate, 12 to 20 cm. long, thick and glossy, with the new growth wine-colored. The large flowers are greenish white, with a conspicuous cluster of long stamens; the fruit is round or oval, 2.5 to 5 cm. in length, whitish green to apricot-yellow in color, with the large round seed (sometimes two hemispherical ones) loose in the seed cavity. The odor and flavor of the fruit are those of the rose, but the texture of the flesh is such that it is not pleasent to eat in quantity. The fruit is sometimes prepared in crystallized form, when it becomes more palatable than it is as a fresh product. The native home of the species is in the East Indies.

PUNICACEAE.

Punica granatum L.

Granada in all those regions where it is cultivated. It is found on the coast, in the Province of Guayas and elsewhere, and in many of the towns of the inter-Andean region, such as Ambato, Ibarra, and Cuenca. It is of little economic importance anywhere in Ecuador, being cultivated as an ornamental rather than as a fruit-bearing plant.

The well-known pomegranate, probably a native of Persia, was introduced into Ecuador during colonial times. It is a shrub 4.5 to 6 meters high, with lanceolate to oblong, obtuse leaves about 7.5 cm. long. The handsome orange-red flowers are axillary and solitary or in small clusters toward the ends of the branchlets. The fruit is globose or flattened, obscurely 6-sided, the size of an orange or sometimes larger. It has a smooth, leathery, brownish red to yellow skin which encloses the numerous seeds, each surrounded by reddish, juicy pulp of delightful subacid flavor, and used for making *refrescos* as well as eating out of hand.

VACCINIACEAE.

Englerodoxa alata Hörold.

Pera silvestre and sometimes *manzanilla* in Tungurahua Province, where it occurs abundantly upon the slopes of the volcano of the same name, at elevations of 3,700 to 3,800 meters. It is not cultivated.

This species, of very little economic importance, is a slender, somewhat wiry shrub, reaching a maximum height of 3 meters. Its leaves are thick and stiff, elliptic to broadly elliptic, entire, and about 2.5 cm. long. The bright crimson flowers, which are 4 cm. in length, are borne in small terminal clusters, and are followed by light red, globose fruits, longitudinally 5-ribbed and about a centimeter in length. These are soft and juicy, and contain a number of minute seeds; in flavor they are thought to suggest the pear, whence the common name usually applied to them.

Disterigma margaricoccum Blake.

Chirimote; one of the characteristic plants of the higher slopes of the Volcano Tungurahua, occurring in great abundance at elevations between 3,400 and 4,000 meters. It is never seen in cultivation.

This beautiful plant is a compact, shapely bush reaching 1.5 meters in height. Its leaves, which are subsessile and produced abundantly on the slender stems, are lanceolate and about a centimeter in length. The flowers are tubular, slightly contracted at the mouth, a centimeter in length, and of rich rose-pink color. They are followed

by round fruits which suggest large pearls in appearance, being translucent white, up to one centimeter in diameter. These fruits are crowned at the apex by four sharply pointed calyx segments; they are tender and crisp, with abundant juice and a few minute seeds. The flavor is pleasantly subacid and very refreshing. Although not an article of commerce they are gratefully eaten by the traveler who chances to pass through the zone in which they grow.

Disterigma popenoei Blake.

Tira, in the Cordillera de Zamora, Loja Province, where it occurs abundantly at elevations between 2,400 and 2,700 meters. It is not cultivated.

This is a shrub about 2 meters high, with elliptic-acute, entire, rather stiff leaves about 2.5 cm. long. The white tubular flowers, about 6 mm. long, are produced abundantly in the leaf axils, and are followed by translucent white berries scarcely 5 mm. in diameter. These have much the same flavor as the *chirimote* of Tungurahua Province, but are not quite so good; they have soft, juicy, acidulous pulp in which a few minute seeds are embedded. The plant occurs in cool and very moist regions, and is of little economic importance.

Macleania ecuadorensis Hörold.

Hualicón on the slopes of the Volcano Tungurahua, at elevations of 2,400 to 3,000 meters, and probably in other parts of the Republic. It is not cultivated.

This is a slender shrub rarely more than 3 meters high, with thick, stiff, oblong-elliptic to broadly oval leaves 7.5 to 12.5 cm. in length. The rose-pink, waxy, tubular flowers, about 2.5 cm. long, are borne in crowded axillary clusters, and are followed by globose fruits about 1 cm. in diameter, purplish black, soft and delicate in texture, with a thin skin and juicy pulp in which are embedded several minute seeds. The flavor is sweet and agreeable. While not an article of commerce, the fruits are eaten by those who live in the regions where they grow.

Macleania laurina Blake.

Chaqui-lulu and *hualicón* in the vicinity of El Angel, Province of Carchi, where it occurs abundantly at elevations of 3,000 to 3,700 meters. It is not cultivated.

Viewed from a horticultural standpoint, this species is very similar to the *hualicón* (*M. ecuadorensis* Hörold) of Tungurahua Province. Its leaves are oblong-lanceolate to ovate, acute, and 5 to 12.5 cm. in length. The rose-pink, tubular, waxy flowers are borne in dense axillary clusters, and are followed by round, dark purple fruits, a centimeter in diameter, containing an abundance of slightly acidulous juice of pleasant flavor.

Macleania popenoei Blake.

Joyapa in the Province of Loja, where it occurs abundantly, as a wild species, in the Cordillera de Zamora at elevations between 2,400 and 2,700 meters. Like the other *joyapas*, it prefers a moist, cool climate. It is not cultivated, but the fruit is sometimes gathered from wild plants and eaten out of hand.

This is a shrub, sometimes half-climbing in habit, and reaching about 3 meters in height. Its leaves are variable in form; commonly they are elliptic-lanceolate, elliptic, or ovate-elliptic, sharply acute, thick and somewhat stiff in texture, and from 5 to 10 cm. in length. The reddish, tubular flowers about a centimeter long are produced in dense axillary clusters. They are followed by round fruits a centimeter in diameter, which are soft, juicy, and sweet to the taste.

Several other species of *Macleania* occur in the Ecuadorian highlands and yield fruits which are eaten, though not highly esteemed. The names *joyapa* and *salapa* are usually applied to them.

Vaccinium floribundum H. B. K. PLATE 48.

Mortiño; very abundant as an indigenous plant throughout the sierra at elevations between 3,000 and 3,700 meters. It is not cultivated, but the fruit is brought into

the markets of Andean villages. In some parts of the country its ripening season, March to August, is the occasion for picnics in the *campo*, the inhabitants of the towns and villages betaking themselves to the places in which this plant grows abundantly, to pick and eat the fruit.

The *mortiño* is a slender, handsome shrub about 2 meters in height, with very small, elliptic to ovate, acute, finely serrate leaves closely crowded on the stems, and small, bell-shaped, deep pink flowers produced in great abundance. The very glaucous blue fruit is roundish, up to about 8 mm. in diameter, juicy, subacid, and pleasant to the taste, and containing several very small seeds. It greatly resembles some of the blueberries of the United States, and could probably be developed by cultivation into a more valuable fruit than it is to-day. In northern Ecuador it is believed that the fruits produced by low, spreading plants are better than those of the tall ones.

SAPOTACEAE.

Achras zapota L.

Níspero on the coast, where it is fairly common. It is rarely seen above elevations of 1,200 meters.

A stately tree, reaching 15 or 18 meters in height, native to southern Mexico and Central America, where it is usually called *chicosapote*. Leaves entire or emarginate, ovate-elliptic to elliptic-lanceolate, thick, stiff, and shining, commonly 5 to 12.5 cm. long. The small, whitish flowers are produced in the leaf axils toward the ends of the branchlets. The fruit is round, oval, or conical, and 5 to 9 cm. in diameter; the thin, brown, somewhat scurfy skin encloses yellow-brown, soft flesh of very pleasant flavor, in which are imbedded several hard, obovate, flattened, shining black seeds about 2 cm. long.

From this tree much of the *chicle* used in the manufacture of chewing-gum is obtained. the principal center of production being southern Mexico and northern Guatemala. The fruit is known as sapodilla in Florida and naseberry in Jamaica; it is highly esteemed in many parts of tropical America, and also in certain oriental countries. The seedling forms grown in Ecuador are not, as a rule, of superior quality; larger and finer fruits are grown in southern Florida and Cuba.

Lucuma obovata H. B. K.

Lucma (sometimes *lucma* and *lugma*) at Loja, where it is fairly common; at the village of Baños, near Cuenca; and at Baños in Tungurahua Province. It does not seem to be known in northern Ecuador, but is probably cultivated in the Oriente, or eastern part of the county, where it may perhaps be indigenous.

This is a little-known and not very highly esteemed fruit. The tree reaches 12 meters in height, and when well grown it has a round, dense crown of very attractive appearance. The leaves, which are clustered toward the ends of the branchlets, are obovate, oval, or elliptic, subacute at the base and rounded to acute at the apex, commonly 12.5 to 25 cm. long, deep green, with the margins entire. The small flowers are produced in great abundance upon the younger branches; they are 2 cm. long, the corolla tubular, deeply 5-toothed, and pale green. The fruit is round to broadly oval, occasionally pointed at the apical end, commonly 7.5 to 10 cm. in diameter. The surface is deep brownish green, heavily marked or overspread with russet. The skin is very thin and easily broken. The flesh is deep yellow, quite firm even in the fully ripe fruit, and of very sweet, typically sapotaceous flavor. The seeds are commonly two, broadly oval, about 3 cm. long, brown and glossy except on the flattened ventral surface, which is white and rough.

Pouteria caimito (Ruiz & Pav.) Radlk.

Cauje in the provinces of the littoral, where it is a common tree, especially in the Province of Guayas.

This plant, known in Brazil as *abiu* and in the Cauca Valley of Colombia (where it is rare) as *caimo*, reaches a height of about 6 meters. Its leaves are obovate to lanceolate, 10 to 20 cm. long, glabrous, and bright green. The fruit is elliptic to round, 5 to 10 cm. long, bright yellow, with a thick, tough skin. Surrounding the two or three large seeds is the translucent, whitish flesh, somewhat jellylike in consistency and of a sweet, pleasant flavor resembling that of the caimito or star-apple. The species is perhaps indigenous in eastern Ecuador, its native home, according to De Candolle, being along the headwaters of the Amazon. The fruit is held in considerable esteem by Ecuadorians, and often appears in the markets of Guayaquil during March and April.

Chrysophyllum cainito L.

Caimito in the coastal lowlands, where it is a common tree.

The star-apple, as this species is called in English is an unusually handsome tree, attaining 12 to 15 meters in height. The leaves are oval or oblong, about 10 cm. in length, deep green and glossy above, and typically golden-brown, with a satin-like sheen beneath. The flowers are small and inconspiucous, purple-white in color. The fruit is round or oblate, 5 to 10 cm. in diameter, smooth, somewhat glossy, either dull purple or light green. The flesh is soft and melting, but not very juicy; it incloses three to five ovate-elliptic, hard, flattened dark brown seeds. The flavor of the fruit is suggestive of that of the other members of this family, such as the *níspero* and the *cauje*. The species is considered to be native to the West Indies and Central America.

Calocarpum mammosum (L.) Pierre.

Lucuma mammosa Gaertn. f.

Mamey colorado in the coastal lowlands, where it is a common fruit tree. In many parts of tropical America it is known as *zapote*, but this name is applied in Ecuador to the fruit of *Matisia cordata*.

The sapote (to use the correct English name) is a large Central American tree, sometimes attaining 20 meters in height. The leaves, which are clustered toward the ends of the stout branchlets, are obovate to oblanceolate, and 10 to 25 cm. long The small flowers are produced in great numbers along the branchlets. The fruit is elliptic or oval, commonly 7.5 to 15 cm. long, russet-brown, with the skin thick, woody, and scurfy on the surface. The flesh is firm, salmon-red, and finely granular. Its flavor is very sweet and, in many varieties, somewhat suggestive of the squash. The seed is large, elliptic, hard, brown, and shining except on the ventral surface, which is whitish and somewhat rough.

OLEACEAE.

Olea europaea L.

Olivo (the fruit, *aceituna*); occasionally seen at Ibarra, Quito, Ambato, Cuenca, and elsewhere in the highlands, but nowhere cultivated on a commercial scale. Luis Cordero says it grows and fruits fairly well in the valleys of Paute, Gualaceo, Chuquipata, and others of southern Ecuador. In the region of Ambato it does not fruit abundantly, and this seems, in fact, to be true of the species in all those sections of the country where it has been planted.

Olives are imported into Ecuador from California and southern Europe. It would be more favorable for the country to produce them, were this practicable; but past experience with the tree is not very encouraging. Possibly there are certain regions in which it will fruit with sufficient regularity to make its culture commercially profitable. The subject is, at least, worth further study. In the dryer parts of the inter-Andean region, at elevations of 2,000 to 3,000 meters, it grows vigorously.

VERBENACEAE.

Vitex gigantea H. B. K.

Pechichi in the Province of Guayas, and elsewhere in the coastal lowlands, where it is rather abundant. The fruit is sold in the markets of Guayaquil during December and January.

The *pechichi* is a tree up to 10 meters high, with palmately compound leaves, composed of elliptic to obovate-elliptic acuminate leaflets, 5 to 15 cm. in length and sparsely pubescent on both surfaces. The small purplish flowers are followed by oval fruits of the size and appearance of ripe olives; they have a thin, almost black skin, juicy brown flesh, and a single elliptic stone of rather large size. The flavor is rather bitter, and not apt to be appreciated by those unaccustomed to it. The tree can not be considered of much economic importance or value.

SOLANACEAE.

Physalis peruviana L.

Uvilla at Ambato, where it grows spontaneously along roadsides, and where also it is cultivated in a small way. The same name is used in Imbabura and Carchi provinces, northern Ecuador, and in the southern provinces, in all of which it is found.

This, the ground-cherry or husk-cherry of northern gardens, is a plant about 60 cm. high, with yellow flowers followed by globose yellow fruits a centimeter in diameter, each surrounded by a dry husk, and having a thin skin which incloses numerous small seeds and a quantity of soft, juicy pulp. When eaten out of hand these fruits are rather insipid, but they are cooked with sugar to form an excellent conserve. The *uvilla* is not of much importance in any part of Ecuador.

Solanum muricatum Ait.

Pepino throughout the inter-Andean region, where it is commonly grown between altitudes of 1,200 and 2,700 meters.

Several good varieties of this Andean fruit are cultivated in Ecuador; the best one probably is the round yellow pepino of the Chota Valley. The latter is commercially cultivated on a small scale, as is also the long, green-fruited form of the region near Ibarra.

The *pepino* is a half-shrubby plant reaching about 60 cm. in height, with trifoliolate leaves, linear-lanceolate to oblong-lanceolate leaflets, and clusters of bluish flowers suggesting those of the potato. Its fruits vary from round to long and slender, and from 5 to 20 cm. in length. They are commonly greenish yellow, with markings of purplish red, but they may also be yellow or light green. Commonly they are seedless; sometimes they contain small seeds like those of the eggplant. The flesh is very juicy, crisp, and of a refreshing subacid flavor suggesting that of the cantaloupe. The plant, which bears fruit during three years, begins to yield five months after planting, producing a crop every three or four months. Sometimes it is attacked by *Phytophthora infestans*, according to Professor Pachano, who has studied this disease at Ambato.

Solanum quitoense Lam. PLATE 49.

Naranjilla throughout the sierra, where it is cultivated at altitudes between 1,500 and 2,600 meters. It succeeds best at 1,500 to 1,800 meters. At Baños, Tungurahua, it is grown on a commercial scale, and the fruit is shipped to Guayaquil, Quito, and other cities. The highest point at which it has been observed is Otavalo (2,600 meters).

The *naranjilla* is a soft-wooded, sparsely branched plant, stiffly erect and reaching about 1.5 meters in height. The stout stems, as well as the leaves, flower buds, and fruits are covered with soft, simple or stellate hairs; on the young leaves and the

flower buds these are light purple, while on the older parts they are almost white. The leaves, which are borne upon stout terete petioles up to 15 cm. in length, are oblong-ovate, 30 to 45 cm. in length, clasping at the base and acute or shortly acuminate at the apex, with the margins sinuate; they are deep green above and light green (with a purplish tinge) beneath, soft, with the midrib and primary lateral nerves conspicuous on both surfaces, but most prominently so beneath.

The flowers are borne in short axillary cymes; they are white, star-shaped, about 4 cm. broad, with five large yellow stamens in the center. The fruits, which are produced upon very short stalks, are round or round-ovate, about 5 cm. in diameter, and bright orange-colored when fully ripe. The coarse hairs with which the surface is covered are easily brushed off; it is the custom to remove them in this manner before the fruits are taken to market. The skin is thick and leathery; it incloses translucent, greenish or yellowish pulp in which are embedded numerous seeds similar to those of the tomato. The pulp is extremely juicy, and of a refreshing subacid flavor which renders it suitable for preparing drinks and water ices.

Cyphomandra betacea (Cav.) Sendt.

Tomate de árbol throughout the highlands, where it is abundantly cultivated.

The tree-tomato is highly esteemed in many parts of the inter-Andean region; it is, in fact, one of the most popular fruits in many sections. It is grown principally between elevations of 1,500 and 3,000 meters; at Baños, Tungurahua (1,800 meters) it is one of the commonest fruit-bearing plants to be seen in the gardens of the town; at Ambato (2,600 meters) it is found in many dooryards, and the fruit appears commonly in the market; at Otavalo and Ibarra (Imbabura Province) it is fairly well known, and is more abundant in the former (2,600 meters) than in the latter (2,200 meters). In Loja (2,200 meters) and in Cuenca (2,600 meters) it is abundantly cultivated, and the fruit is sold in the markets.

The tree-tomato, as it is called in English, is a half-woody shrub reaching to a height of 3 meters, usually a miniature tree in form. The leaves are cordate-ovate, often 15 to 20 cm. long; small, pinkish flowers are produced in the leaf axils in small clusters. The fruits are oval to elliptic, commonly 5 cm. in length, and orange-red. In character of flesh and seeds they resemble the common tomato, which they suggest also in flavor. They are usually prepared for eating by stewing in sirup, to form a *dulce* or conserve.

JUGLANS HONOREI DODE.

The native black walnut of Ecuador, commonly called tocte by the Indians. Photographed near the city of Ambato.

PERSEA AMERICANA DRYMIFOLIA (CHAM. & SCHLECHT.) BLAKE.

This enormous avocado tree of the Mexican race stands on the lower slopes of the Patate Valley, not far from the city of Amt[illegible]

FRAGARIA CHILOENSIS DUCH.

Strawberry pickers in a field at Guach , near Ambato. Cons'derable areas are nere devoted to the cu tivat on of the Chilean strawberry

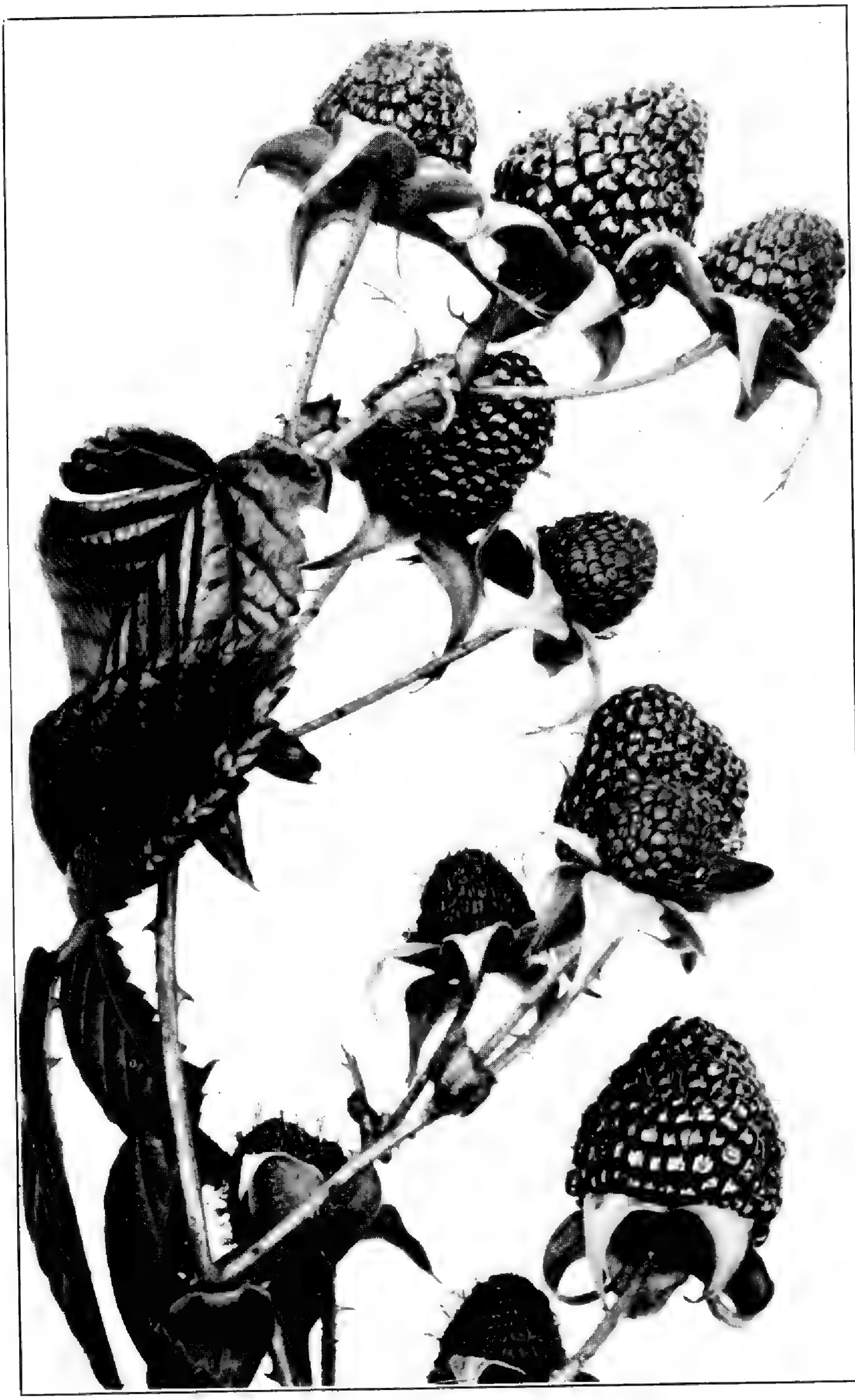
FRAGARIA CHILOENSIS DUCH.

Fruits and flowers of the Chilean strawberry, as grown at Guachi, near Ambato.
(Natural size.)

RUBUS GLAUCUS BENTH.

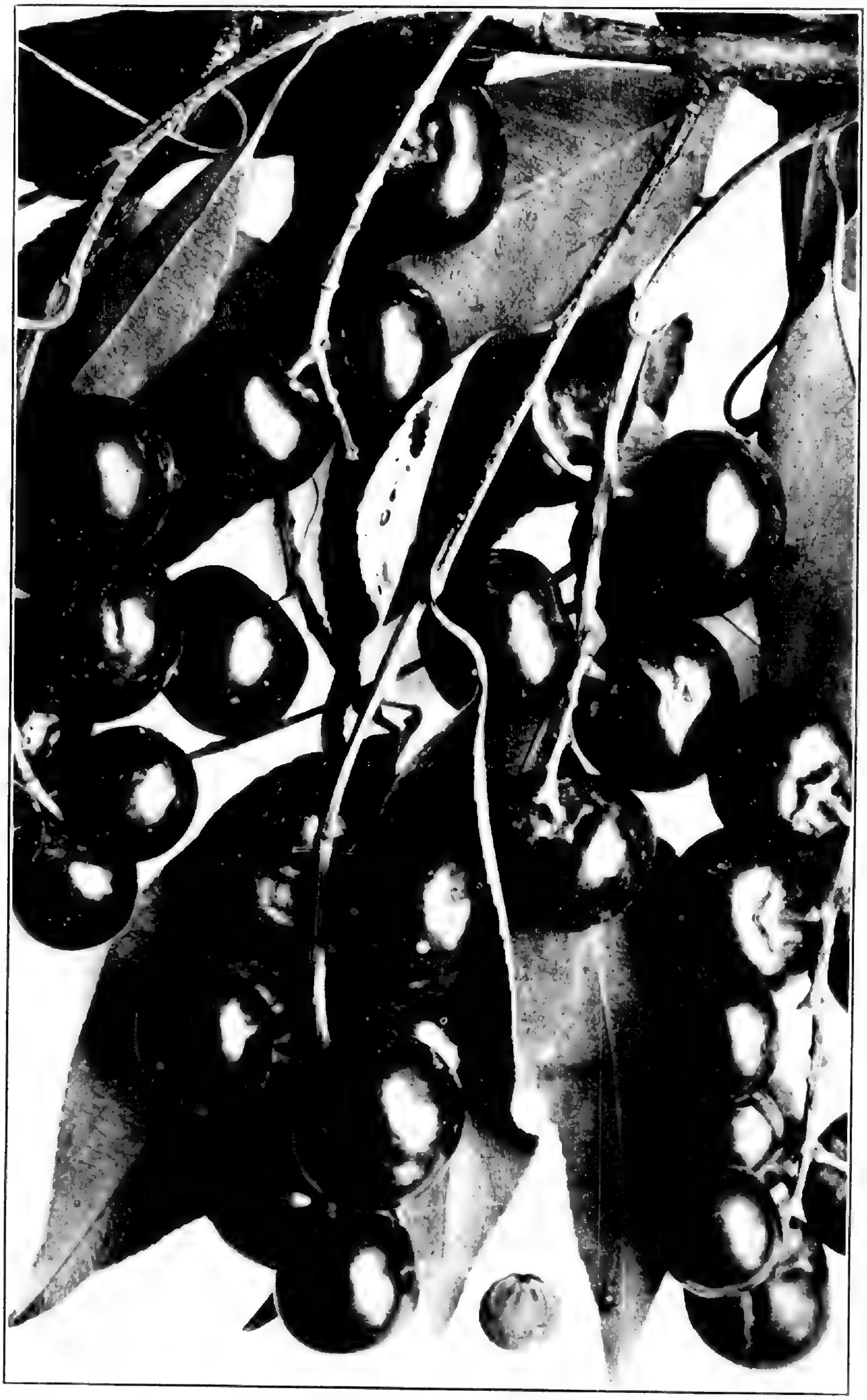
The Andes berry, known as mora de Castilla in Ecuador and Colombia; photographed at Ambato. Natural size.

RUBUS ADENOTRICHOS SCHLECHT.



RUBUS ROSEUS POIR.

A large-fruited red raspberry growing at high elevations in Ecuador. Photographed at Baños, Province of Tungurahua. (Natural size.)

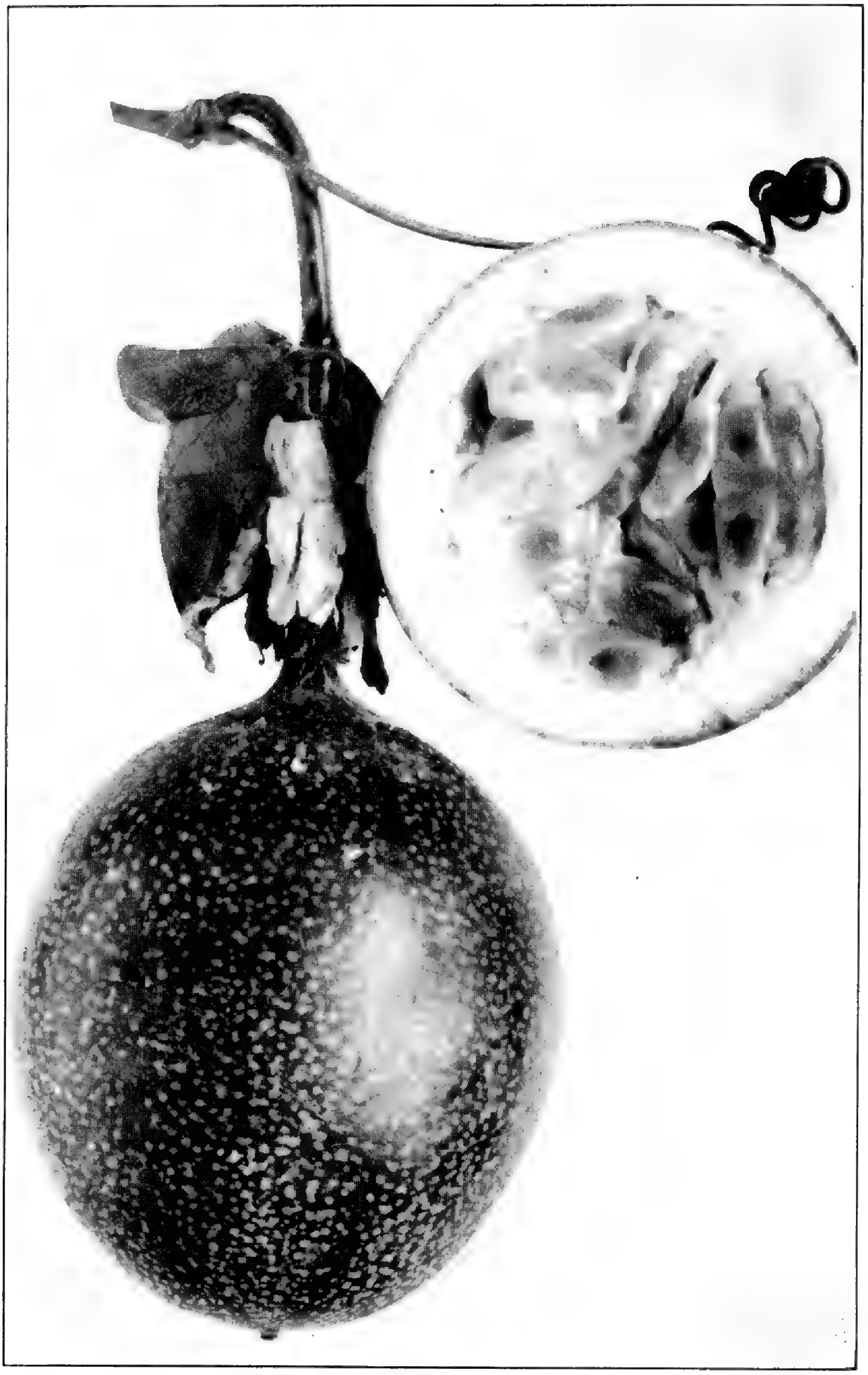


PRUNUS SEROTINA EHRH.

Fruit clusters and fol age from the Gonza es tree, a cho'ce va'iety c' t'e capulí, grown at Catiglata, n the suburbs of Ambato. (Natural size

PASSIFLORA POPENOVII KILLIP.

A rare species from the eastern slopes of the Ecuadorian Andes, where it is called granadilla de Quijos. Photographed in a garden at Baños, Province of Tungurahua



PASSIFLORA LIGULARIS JUSS.

The common granadilla of tropical American highlands, from southern Mexico to Peru. Photographed at Ambato. (Natural size.)

PASSIFLORA MOLLISSIMA H. B. K. BAILEY.

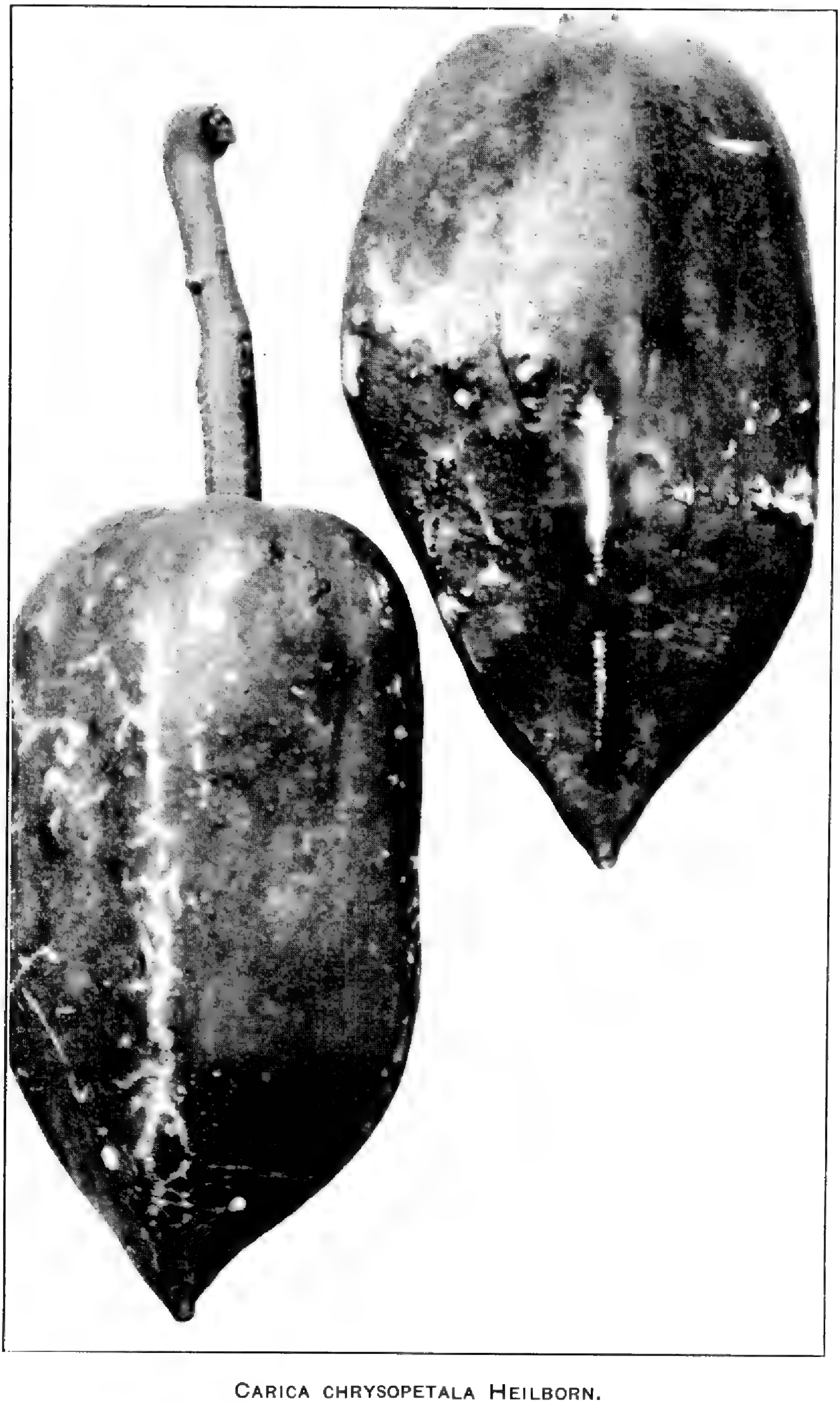
The common tacso of the Ecuadorian highlands, called curuba in Colombia. Photographed at Bogotá, Colombia

CARICA CANDAMARCENSIS HOOK. F.

A mature plant of the small-fruited hardy papaya found throughout the northern Andean region; in Ecuador known usually as chilhuacán and chamburo. Photographed at Nemocón, Cundinamarca, Colombia

CARICA PENTAGONA HEILBORN.

The babaco of Ecuador, fruiting in a garden at Ambat



CARICA CHRYSOPETALA HEILBORN.

Fruits of the higacho, from a cultivated plant at Baños, Province of Tungurahua.
(Natural size.)

VACCINIUM FLORIBUNDUM H. B. K.

The mortiño, or Andean blueberry, a characteristic plant of the cold, moist plains of the high Andes. Photographed at La Rinconada, Province of Carchi. (Natural size.)

SOLANUM QUITOENSE LAM.

Fruits of the naranjilla; photographed at Baños, Province of Tungurahua (Natural size.) The coarse hairs are brushed off before the fruits are taken to market

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VOLUME 24, PART 6

A BIBLIOGRAPHIC STUDY OF BEAUVOIS' AGROSTOGRAPHIE

By CORNELIA D. NILES

WITH INTRODUCTION AND BOTANICAL NOTES

By AGNES CHASE

WASHINGTON
GOVERNMENT PRINTING OFFICE
1925

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PREFACE.

The 256-page book on grasses published by Palisot de Beauvois in 1812 under the title Essai d'une Nouvelle Agrostographie has been a source of confusion to botanists for more than a hundred years. Beauvois rendered an important service to science by introducing into the study of grasses the use of many important characters that had not previously been utilized in the classification of these plants, but in applying his new method to the grasses known at that time, more than 2,000 species, his work was often very careless. The application of many of his new names and binomials is obscure, and they have been differently interpreted by different writers. Beauvois proposed in this book many new genera and more than 600 new binomials. The correct identification of these genera and species is of fundamental importance to the study of grasses in all parts of the world. In the accompanying paper Miss Cornelia D. Niles and Mrs. Agnes Chase, Bureau of Plant Industry, United States Department of Agriculture, present the results of a long and painstaking study of Beauvois' book. All his genera and most of his species are represented in the United States National Herbarium. A type is indicated for each genus and species, the reason for the choice being given in each instance. The genera have been identified, and all but a small number of the species. This information has been of great assistance in the grass studies carried on at the National Herbarium and it is believed that its publication will be of similar value to students of grasses elsewhere.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

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A BIBLIOGRAPHIC STUDY OF BEAUVOIS' AGROSTOGRAPHIE

By Cornelia D. Niles

WITH INTRODUCTION AND BOTANICAL NOTES

By Agnes Chase

INTRODUCTION

The *Essai d'une Nouvelle Agrostographie; ou Nouveaux Genres des Graminées; avec figures représentant les Caractères de tous les Genres*, by A. M. F. J. Palisot de Beauvois, published in 1812, is, from the standpoint of the nomenclature of grasses, a very important work, its importance being due principally to its innumerable errors, less so because of its scientific value.

In this small volume 69 new genera are proposed and some 640 new species, new binomials, and new names are published. Of the 69 genera proposed 31 are to-day recognized as valid, and of the 640 names about 61 are commonly accepted. There is probably not a grass flora of any considerable region anywhere in the world that does not contain some of Beauvois' names.

Many of the new names are made in such haphazard fashion that they are incorrectly listed in the Index Kewensis. There are, besides, a number of misspelled names that have found their way into botanical literature. The inaccuracies are so numerous and the citations so incomplete that only a trained bibliographer could solve the many puzzles presented. Cornelia D. Niles in connection with her work on the bibliography of grasses, maintained in the form of a card catalogue in the Grass Herbarium, worked out the basis in literature of each of these new names.

The botanical problems involved, the interpretation of descriptions and figures, were worked out by Agnes Chase, who is also responsible for the translation and summaries from the Advertisement, Introduction, and Principles. The translation is a free one in that no attempt has been made to preserve the author's style. No pains

have been spared to convey the precise meaning, but it is given in as few words as possible. Beauvois' writing is exceedingly verbose, with numerous references to "the useful and amiable science of botany." These literary rococo decorations have been omitted.

SUMMARY OF BEAUVOIS' ESSAY.

Beauvois' Essay consists of two parts, preceded by an Advertisement, explaining the purpose of the work. Part one, pages i to lxxiv, is in French. It consists of an Introduction explaining Beauvois' New Principles of Agrostology, and describing and discussing the structure of grasses from root to grain, with a chapter on the classification [Méthode] of earlier authors and an explanation of his proposed new method. There follows a combined glossary, explanation of abbreviations and partial bibliography. A large Tabula Methodica (in Latin) showing the arrangement of genera in sections, these in cohorts, these in tribes, and the tribes in families, is inserted at the end of the introduction.

The second part of the work (pages 1 to 145) "Genera Novae Agrostographiae" is in Latin with observations in French. The genera are arranged in accordance with the classification shown in the Tabula Methodica. The "index" is a combination of an index and a list of identifications, many names of grasses not included in the text being listed and referred to particular genera, many followed by "?" This index is of importance because it is only by means of references there given that the basis of many of Beauvois' names can be ascertained.

The Essay, which is an octavo, is accompanied by a quarto of 25 plates of several figures each, with explanations. The validity of some of Beauvois' names is based on the names and brief descriptions given in these explanations.

The more important parts of the Advertisement and Introduction are here presented in translation. Other parts are summarized, the summaries being set in smaller type. The translations and summaries will give an idea of Beauvois' understanding of the morphology of grasses and of his proposed new system of classification. They also show the self-confidence and want of accuracy characteristic of the author, which resulted in the confusing complex of botanical and bibliographical problems we here attempt to solve.

"ADVERTISEMENT."

"This work is as yet only an attempt, subject to change and improvement. The confusion, I should even say disorder, found in this important branch of botany does not admit of the desired degree of perfection in a first tentative work. Such as it is, however, I venture

to flatter myself that it will lead to a more perfect knowledge of the grasses. The changes which may [hereafter] be made will be in certain details, in the uniting or segregating of genera; but I do not think it will be possible to attack at all the basis and principles of the classification [Méthode]. All the genera are there distinguished by characters certain, constant, and easy to comprehend.

"Some persons, perhaps too much attached to the old order, will protest against the great number of genera. But this protest will not be on the part of botanists devoted to the progress of the science; they will not be in haste to judge, and, before expressing their opinion, they will wish to examine the new classification, to study it, to catch the spirit of it as a whole, without devoting themselves minutely and separately to details which are an integral part of the whole.

"It may be that some of the new genera will have to be reduced, * * * such as *Sorghum* to *Andropogon*, *Aira* to *Avena*, *Dactylis* and *Koeleria* to *Bromus*, *Meoschium* to *Colladoa*, *Milium* and *Axonopus* to *Paspalum*, *Cinna* to *Apera*, *Chondrosium* to *Bouteloua*, etc.

"However, I present this essay to botanists. Their judgment and their counsel will enable me to carry the Agrostographie to the highest degree of perfection possible and desired. * * *"

Beauvois planned to follow the Essay with a larger work giving detailed descriptions of all the species. To this end he begs botanists to send him species not found in his collections. In this projected work he expected the cooperation of Desvaux. Their intention was to illustrate all the species not figured by well-known authors, such as Morison, Plukenet, Schreber, Host, Cavanilles, etc. Beauvois counted on this work to enable him to perfect his classification. The illustration of the species had been commenced and so far as completed the figures were published with the Essay. The plates were issued in quarto because it would increase the size and the price of the work if they were printed in octavo like the text, while to print the text in quarto would make an inconvenient volume. A limited edition in quarto was published.

"In many parts of this work I have made it a rule to cite the names of the botanists who have contributed [specimens] from their collections, with the amenity, zeal, and benevolence characteristic of every botanist zealous for the science * * *. I shall here present the list in order to pay publicly to these scholars the tribute of my thanks. They are MM. de Jussieu, Desfontaines, who not only placed their herbaria at my disposal, but contributed [specimens] from the beautiful and rich collections of the Natural History Museum; Bosc, known for his zeal for science * * *; Dupetit-Thouars, de Lessert, Desvaux, Persoon, Richard, Poiret, Delile, Thuillier, Gay, to whom I owe a large number of species described by Gaudin, Roemer, and Balbis. The last two have sent me all the exotic or indigenous grasses which they have at their disposal."

Owing to the difficulties of correspondence [during the Napoleonic wars] Beauvois had not been able to establish communication with Swartz, Thunberg, Afzelius, Robert Brown, and others. If his letters had reached them he is confident they would have been eager to send him what he asked, and his work would have been more complete, especially in regard to the great number of obscure genera which he could not place definitely in his classification. He hoped that his Essay would reach them and that their advice and interest would enable him to add two plates illustrating the characters of the genera as yet unknown to him.

There follows a request that botanists will note the Errata (given after the index).

"INTRODUCTION."

"The grasses, including wheat, maize, rye, barley, millet, sugar-cane, oats, and the innumerable genera and species which adorn and enliven the prairies, are, undeniably, the most generally useful of all plants known. These valuable plants supply the needs of man in all climates, whether for his own food or for that of the domestic animals which serve his need or his pleasure. 'The leaves of grass afford rich pasture to flocks and herds: the small seeds are food for the birds and the larger seeds are food for men' [Linnaeus] Philos. Bot. * * *

"In our climate the grasses are of especial interest; they are the basis of the comfort and wealth of the landowner. They yield a bountiful return for the care and labor of the farmer. Even the poor man, gleaning after the reapers, secures food for his numerous family for part of the winter; and the culms gathered with care serve to thatch his humble cabin. Finally the grasses are not less interesting to the botanist * * * the object of his researches and meditations.

"When one contemplates the value of the grasses one is astonished that this branch of botany has not, up to the present time, attracted the same attention, excited the same enthusiasm and interest, as have other plants, doubtless more beautiful in foliage and flower, but of less special utility; and that the study of these plants has not been undertaken and followed with a perseverance proportionate to their value and which their interest deserves.

"Nevertheless, since Micheli, Ray, Scheuchzer, Gahn, and Linné, who must be regarded as the founders and the foremost reformers of agrostology, many botanists have directed their attention to the grasses. Schreber studied them in their smallest details. Desfontaines, Swartz, Loureiro, Richard, Muhlenberg, Leers, Roth, Schrader, Persoon, Willdenow, Desvaux, Gaudin, etc., have published many new genera, and a large number of species, described with great exactness. In the enumeration of these scholars * * * I ought to include also Aubert du Petit-Thouars and Desmaziéres. The first has drawn from life nearly all the species of grasses which

he met in his travels; he has shown me his drawings, while communicating to me a great number of new species, and I can not but regret that this keen observer has not yet published his work. The second young botanist, pupil of Lestiboudois, learned professor of natural history at Lille, has recently published an agrostographie of the northern departments [of France]. Finally I will mention * * * the scholar, Robert Brown, who seems to have studied the grasses after new principles, often in accord with mine.

"But though these authors have advanced knowledge by the publication of many new genera and species, they have not contributed in the same proportion to the extension of science in respect to underlying principles. ["Mais, si les ouvrages de ces divers auteurs ont donné lieu à quelques changements heureux par la publication de plusieurs genres et de plusieurs espèces nouvelles, ils n'ont pas contribué, dans la même proportion, à étendre les limites de la science, sous le rapport de la partie Dogmatique et de ses bases fondamentales." Possibly Beauvois literally meant dogmatic. His own "Method" is largely dogmatic, with assumed principles, based on unverified statements.] The great number of genera earlier published and in need of revision remain in uncertainty and confusion. This want of order appears to be due to three principal causes: (1) The neglect or want of consideration given to certain characters of which the importance and real value had not, perhaps, been sufficiently appreciated or which had been artificially used. (2) The undue importance and value attributed to variable characters which do not hold for all the species of a single genus and are often found in the species of different genera. (3) The reluctance or the timidity of certain botanists, too timid to dare to leave the beaten path and to disregard criticism and conformity, prejudices, and restrictions.

"In the interest of science I have determined to follow a different course. My natural taste for observation, increased by habit and use during my extended travels, has fixed my attention on those parts of botany that appear to me the most neglected. After the mosses the grasses are, without doubt, the least well known. I believe that this order of plants demands great changes, I do not fear to say even an almost complete revision. With this idea in mind I worked on each species separately; then having compared the species and considered them as a whole, I am convinced that the characters [hitherto] adopted are, for the most part, vague, imperfect, negative, and that botanists have neglected other characters much more important, more constant and more natural. I noted that the foundation and principles hitherto adopted had not the advantage of these [more constant and natural] characters; I sought for other principles, based on constant and characteristic

organization of these plants. These researches suggested to me the idea of a new classification. I submit it to the discernment of botanists whose counsel, advice, and just criticism I shall always welcome with gratitude.

"Some persons will, perhaps, protest against the innovations introduced, the great number of new genera and the new terms; but I beseech the indulgence of botanists zealous for the progress of the science—of those who know how to grasp realities and facts, and not just the words; I charge them to lay aside all bias, to put aside for the moment the old principles and the old foundations which form agrostological precedents—to weigh, examine, consider the whole with the impartiality of true scholars; in so doing I believe they will feel the necessity of what at first might be taken for arbitrary and systematic innovations.

* * * * * * *

"The genera are very numerous, undoubtedly, but it is not the number of them that ought to make one pause, but their characters only. If according to the characters which constitute them the genera are natural; if they are so distinct from each other that the differences prove their organization to be diverse; if, finally, they are so defined that they can not be confused, what matters their number, seeing that nature has produced them? I dare to assert with assurance, that there is not one of the new genera proposed which has not characters more prominent, more natural, and more easy to understand than the greater part of those previously established, and of which the characters are in large part negative. I shall mention but a single example (lest any take fright) of a genus, accepted as valid in this work, which ought to be amended, that is, *Sorghum*. It has no positive and constant character which separates it from certain species of *Andropogon*. Moreover, in order to leave the choice to botanists, as to whether or not they will accept the new genera I propose, I have not numbered them, and have placed them, so far as the classification permitted, immediately following the old genera from which they have been segregated.

"One will, perhaps, be surprised that I have not conserved certain names already in use. Such, among others, as *Leersia*, *Lappago*, *Sturmia*, which I name *Asprella*, *Tragus*, *Mibora*. But on reflection one will see that this is but justice to those concerned. Certainly it matters little to science that such genera should bear this or that name; but in failing to establish any rule in the matter it follows that nomenclature becomes arbitrary and synonymy becomes so confused as to obstruct and hinder the progress of science. Take, for example, *Mibora*. Adanson was the first to establish the genus which Linnaeus had included in *Agrostis;* long after this Smith named it

Knappia, and, quite recently, this name was adopted by Koeler and Gaudin. Recently Hope [error for Hoppe] changed the name, substituting *Sturmia*, and this is taken up by Willdenow, Persoon, etc. Finally Wiber [error for Wibel] rejected the existing names and renamed the plant *Chamagrostis*, which Decandolle prefers. I ask in all confidence what should one do with such confusion? Is it not better to give preference to the oldest name, chosen by the author who established the genus? But, in order to make this rule apply generally, and to avoid sundry inconveniences, I propose to fix a time beyond which the name should not again be taken up. For this date I take the works of Linnaeus, and I think that for all genera published since that celebrated botanist the names bestowed by those who first distinguished them should be conserved, when these names are not too barbarous to be admissible. Therefore *Leersia* should be discarded for *Asprella*, given by Schreber and already adopted by Delamarck, as should the still older *Homalocenchrus*, an inadmissible name, which Haller[1] had earlier chosen; and the same for all the others. If botanists will adopt this principle there will be in the future neither arbitrariness nor confusion in the nomenclature of the old genera which it may be desirable to restore. *Mibora* will no longer be called *Knappia* in England and part of Germany; it will not be *Sturmia* for one, *Chamagrostis* for the other; it will be *Mibora* throughout the world and botanists will understand one another much better."

"NEW PRINCIPLES OF AGROSTOLOGY."

"The grasses, like all other plants, are composed externally of root, stem, leaves, and flowers. Each of these parts presents differences and characters peculiar to the grasses, and makes them easy to distinguish from all other orders. Internally one recognizes the two tissues, cellular and tubular, as in other Phanerogams, but differently disposed, arranged, and modified.

"The cellular tissue composes most of the bulk and soft part of the plant. The tubular tissue is distributed regularly by longitudinal bundles and forms the fibers in most species; these bundles are arranged in concentric circles in the cellular tissue which surrounds them.

"Each of these rows of bundles of fibers is the origin of one of the leaves which the culm successively bears; this explains why the whole culm is much larger at the base and becomes smaller in diameter as it rises and bears leaves. The rows of bundles of fibers which remain at the center during the growth of the plant are des-

[1] The reference is to Hall. Nom. Hist. Pl. Helv. 128. 1769. The genus was published by Mieg in 1760.

tined to produce the flowers, and their number is found to be in proportion to the number of spikelets which the spike or panicle is to bear."

This idea, that the culm was made up of coalesced tubes, separating successively as leaves, is elaborated and illustrated. The cross sections shown are said to be from barley. One section (*plate 2, figure 6*) seems to have been drawn from the cross section of the culm with the surrounding sheath adhering to it. The others are obviously imaginary, drawn to illustrate the author's idea.

Five chapters are devoted to the structure of the grasses, chapter 1, the root; 2, the culm; 3, the leaves; 4, the axis of inflorescence; 5, the fructification. There are some misconceptions in morphology but nothing that appears to be imaginary, like the account already given of the formation of the leaves from concentric rows of fibro-vascular bundles separating successively from the culm. In chapter 4 Beauvois distinguishes two forms of axis: (A) "simple [in distinction from articulate, not from compound] and entire," [plate 1, figures 1, 2, 5, 6, 7, 11, cited as examples are respectively, inflorescences of *Alopecurus*, *Arrhenatherum*, *Spartina*, *Dactyloctenium*, *Cornucopiae*, *Andropogon*]; and (B) "articulated and dentate" [plate 1, figure 9, cited as example is *Secale cereale*]. These two forms had not been distinguished by botanists, he says, hence he calls special attention to them and then makes two generalizations (which do not hold): (1) "In all grasses with simple and entire floral axis the glumes are more or less unequal, sheathing, and inserted alternately." (2) "In all grasses with articulate or dentate floral axis the glumes are either opposite or paired, rarely sheathing, inserted parallel on the articulation or the tooth of the rachis." (See Tabula Methodica for genera included in the tribes based on the floral axis as distinguished. It will be seen that genera of *Andropogoneae* with thickened rachis joints as well as a few genera of *Festuceae* and *Chlorideae* are classed with genera of *Hordeae* as having dentate axis.)

In chapter 5 the grasses are divided into two families: 1, Monothalama, in which the spikelets are uniform; and 2, Polythalama in which the spikelets are of two kinds. These form the primary divisions of the classification. In Monothalama Beauvois distinguishes between hermaphrodite and polygamous spikelets, and restricts the term polygamous to those spikelets in which the lower florets are staminate or neuter (as in *Paniceae*, *Phalarideae*, and *Arrhenatherum*). He holds that the term is not accurately applied to spikelets of *Chloris* and *Dactyloctenium* in which the upper florets are aborted, since commonly the essential organs are present but rudimentary, as in *Poa*, *Festuca*, *Melica*, and others.

"The spikelets are pediceled or sessile, solitary, paired, or verticillate, naked or subtended by an involucre."

The involucre is treated as a definite organ. As examples of involucres are mentioned and figured the bell-shaped sheathing leaf in *Cornucopiae;* the "bead" in *Coix;* the sterile spikelet below the little cluster of perfect ones in *Cynosurus;* the bractlets at the base of the panicle in *Sesleria*, and the entire silky pubescence in *Saccharum*, *Imperata*, *Erianthus*, and *Perotis*. In the latter it is the "long tomentum at the base of the spike" which he considers the involucre. [In immature panicles of *Perotis latifolia*, the species figured, the undeveloped spikelets at base present a mass of slender awns. In mature panicles there is no "tomentum."] Beauvois explains that in a true involucre, whatever its texture, membranaceous or silky, the parts are inserted

at the same point, like verticils. The silk in *Andropogon, Arundo* and other grasses is not so arranged and does not constitute an involucre. In the text *Cenchrus, Anthephora, Pennisetum,* and other genera are described as having involucres.

The discussion of the parts of the spikelet shows that Beauvois had a fairly accurate concept of their morphology. He follows Jussieu in the use of the term glumes (as applied to-day) for the "calix" of Linnaeus. The two glumes form the "tegmen" (covering) distinguished from the lower and upper paleae (lemma and palea), the "corolla" of Linnaeus, which form the "stragulum" (another word for covering) which incloses the true flower.

The bristle ("seta") is recognized as a prolongation of a nerve, "usually straight, rarely twisted, sometimes departing abruptly from the membranaceous part of the lemma, sometimes from the summit, or from the back or at the base; it may be elongate and bordered by the gradually disappearing membranaceous summit as in *Festuca, Triticum, Secale, Hordeum,* etc. * * * Botanists have confused the bristle with the true awn and have referred to both under the common name 'arista'." The following definition will differentiate the two.

"Awn, Arista * * * Hard, coriaceous, inserted abruptly and usually without an evident origin [not an evident continuation of a nerve], serving often as a sheath to the bristle which it embraces and to which it strongly adheres. The strongest lens does not reveal any indication of it below its insertion." The awn of *Avena* is figured as an example. "The awn differs from the bristle (1) by the texture hard or coriaceous; (2) by its base or insertion, which appears to arise abruptly; (3) usually by a bend near the middle, the lower part twisted in a spiral and commonly hygroscopic; (4) by its proportion compared with that of the bristle and its thickness due to the addition of the coriaceous substance." *Agrostis canina, A. rubra, Calamagrostis, Trisetum,* and *Andropogon,* all with twisted, geniculate awns, are figured as examples. In a further discussion Beauvois states that there are rare cases in which the awn, entirely herbaceous, does not differ from a bristle properly so-called. The awns of *Piptatherum paradoxum* (*Milium paradoxum*), *P. coerulescens* (*Milium caerulescens*), and *P. punctatum* (*Eriochloa punctata*) are figured as examples.

There is a long discussion maintaining the validity of this differentiation, which is so important a part of his classification. Beauvois says "Botanists have not distinguished the bristle from the awn, but the elders did not confound in a single genus species with bristles, others with awns, and still others muticous, as Linnaeus has done in such genera as *Agrostis, Aira, Ischaemum, Milium, Festuca, Saccharum,* etc."

The lodicules, stamens, and pistil, composed of ovary, style and stigmas, and the grain are discussed at length. Beauvois points out that in the Linnaean system, based on the number and position of stamens, natural relationships are disregarded, the grasses being distributed in classes remote from each other.

Chapter 6 is a discussion (1) of the classifications of earlier authors and (2) an explanation of the new classification, by which "once having grasped the principles, it will be easy to classify all the plants in their family, their tribe, their cohort, and their genus."

"This classification does not at present include all known genera of grasses; there are some that are distinguished by peculiar characters. These characters appear to exclude such plants from this

TABULA METHODICA.

- **Family I: Monothalama. Spikelets all alike**
  - **Tribe I: Axis continuous. Glumes alternate**
    - **Cohort I: Spikelets 1-flowered**
      - Section 1 — Spikelets without glumes — Zoysia. Asprella.
      - Sect. 2.—Spikelets with glumes. Floret of 1 bract.
        - Lemma awned — Cornucopiae, Alopecurus. Agraulus.
        - Lemma muticous — Trichodium. Perotis. Saccharum.
      - Sect. 3.—Floret of 2 bracts. Lower glume the larger
        - Lemma muticous — Imperata. Eriochrysis, Ceresia. Paspalum. Axonopus. Milium. Gen. obsc. Reimaria.
        - Lemma with bristle [3]
          - Bristle terminal — Erianthus. Calamagrostis. Chaeturus. Vilfa.
          - Bristle below apex — Polypogon.
        - Lemma awned
          - Awn terminal — Piptatherum. Stipa. Oryzopsis. Achnatherum. Gen. obsc. Streptachne.
          - Awn below apex — Gastridium.
          - Awn from base — Agrostis. Colobachne.
      - Sect. 4.—Lower glume the smaller
        - Lemma muticous — Crypsis. Tragus. Heleochloa. Phleum. Achnodonton. Spartina. Sporobolus. Gen. obsc. Trichoon.
        - Lemma with bristle
          - Bristle terminal — Oryza. Muhlenbergia. Clomena. Podosemum. Mibora. Chaetaria.
          - Bristle below apex — Apera. Cinna. Curtopogon.
        - Lemma awned
          - Awn terminal — Arthratherum. Aristida. Pentapogon.
          - Awn from back — Lagurus.
    - **Cohort II: Spikelets semi-2-flowered** [4]
      - Lemma muticous — Phalaris. Chilochloa. Cynodon. Gen. obsc. Coelachne.
      - Lemma with bristle
        - Bristle terminal — Brachyelytrum. Bouteloua. Chondrosium. Triathera.
        - Bristle below apex — Gymnopogon. Enneapogon.
      - Lemma awned — Anisopogon. Deyeuxia.
    - **Cohort III: Spikelets many-flowered. Florets polygamous**
      - Sect. 1.—Spikelets 2-flowered
        - Lemma muticous — Panicum. Paractaenum. Anthaenantia. Hymenachne. Monachne. Streptostachys. Digitaria. Gen. obsc. Neurachne. Isachne.
        - Lemma with bristle — Urochloa. Echinochloa. Oplismenus. Setaria. Melinis. Gen. obsc. Dimeria.
        - Lemma awned — Arrhenatherum. Pogonatherum.
      - Sect. 2.—Spikelets 3-many-flowered
        - Lemma muticous — Ichnanthus. Cenchrus. Anthephora. Penicillaria. Pennisetum. Gymnotrix. Arundo. Ehrartha. Gen. obsc. Tetrarrhena.
        - Lemma with bristle
          - Bristle terminal — Trochera. Hierchloa. Microlaena. Torezia. [Torresia.]
          - Bristle below apex — Campulosus.
        - Lemma awned — Anthoxanthum.
    - **Cohort IV: Florets perfect**
      - Lemma muticous — Cynosurus. Elytrophorus. Briza. Melica. Molinia. Centotheca. Orthoclada. Poa. Eragrostis. Airopsis. Leptochloa. Eleusine. Dactyloctenium. Gen. obsc. Achneria.
      - Lemma mucronate — Schismus. Megastachya. Uniola. Ceratochloa. Graphephorum. Triodia. Tricuspis.

- Family II: Polythalama. Spikelets of two kinds
  - Tribe II: Axis articulate or dentate. Glumes parallel [opposite]
    - Cohort V: Spikelets many-flowered
      - Sect. 1.—Florets perfect
        - Lemma with bristle
          - Bristle terminal — Donax. Sesleria. Chloris. Streptogyna. Diplachne. Triplasis. Enneapogon. Pappophorum. Echinaria. Gen. Obsc. Triraphis.
          - Bristle below apex — Rabdochloa. Koeleria. Dactylis. Calotheca. Trichaeta.
        - Lemma awned
          - Awn dorsal — Bromus. Holcus. Trisetum. Avena.
          - Awn basal — Aira. Deschampsia. Corynephorus.
          - Awn terminal — Pommereula. Danthonia. Pentameris. Gen. Obsc. Eriachne. Ectrosia.
        - Lemma awned — Gaudinia.
        - Lemma muticous — Beckmannia. Glyceria. Catabrosa. Sclerochloa.
        - Lemma with bristle
          - Bristle below apex — Schenodorus. Dineba.
          - Bristle terminal — Festuca. Brachypodium. Lolium. Agropyron. Triticum. Aegylops. Secale. Elymus.
      - Sect. 2.—Florets polygamous
        - Lemma muticous — Ischaemum. Trachis. Lodicularia. Rottboella. Gen. obsc. Xerochloa. Lepturus. Zeugites.
        - Lemma with bristle
        - Lemma awned — Meoschium. Arthraxon. Colladoa. Gen. obsc. Chamaeraphis.
    - Cohort VI: Spikelets 1-flowered
      - Lemma with bristle
        - Spikelets polygamous — Zeocriton.
        - Spikelets perfect — Hordeum.
      - Lemma muticous — Microchloa. Ophiurus. Monerma. Nardus.
  - Tribe III: Axis articulate or dentate. Glumes parallel
    - Cohort VII
      - Sect. 1.—Stamens 3 — Tripsacum. Manisuris. Peltophorus. Gen. obsc. Raphis. Elyonurus? Sehima? Themeda?
      - Sect. 2.—Stamens indefinite, numerous — Pariana.
  - Tribe IV: Axis continuous. Glumes alternate
    - Cohort VIII: Axes polygamous
      - Sect. 1.—Spikelets 1-flowered
        - Lemma with bristle — Ægopogon. Chrysurus. Zizania. Olyra. Gen. obsc. Dipogonia.
        - Lemma muticous — Pharus. Gen. obsc. Potamophila. Leptaspis.
      - Sect. 2.—Spikelets many-flowered
        - Lemma muticous — Thuarea. Anatherum. Calamina. Gen. obsc. Cymbachne?
        - Lemma awned — Andropogon. Sorghum. Diectomis. Apluda. Anthistiria. Heteropogon.
    - Cohort IX: Axes unisexual
      - Sect. 1 — Monoecious — Lithachne. Hydrochloa. Luziola. Zea. Coix.
      - Sect. 2 — Dioecious — Spinifex. Gynerium.

[1] See page 143 for differentiation between bristle (*seta*) and awn (*arista*).
[2] The same as sesquiflora (a flower and a half) of later authors.

GENERA OF UNCERTAIN POSITION.

- Style simple
  - Stigma simple — Lygeum.
  - Stigma 2
    - Lodicules 2 — Nastus.
    - Lodicules 3 — Bambusa.
- Style 2-parted. Stigmas 2. Lodicules 2 — Psamma.
- Style 3-parted. Stigmas 3.
  - Lodicules 2 — Diarrhena.
  - Lodicules 1 — Remirea.
  - Lodicules 3 — Arundinaria. Stemmatospermum.

Obscure genus: Diaphora.

order and to show an approach to *Cyperaceae*. The most striking genera are *Lygeum*, *Nastus*, *Bambusa*, *Stemmatospermum* * * *. For this reason I give a sort of appendix to my classification.[2] The researches of botanists will determine whether these plants should be included among the grasses (if they should it will not be difficult to arrange them in their respective places) or whether, as I surmise, they constitute a distinct order intermediate between *Gramineae* and *Cyperaceae*."

CLASSIFICATION OF THE GENERA IN BEAUVOIS' ESSAY.

Following is a list of the genera in Beauvois' table, with the names in present use, if different, indicated by = sign. Where a generic name is misapplied by Beauvois, as in *Arundo*, the genus to which he refers (but which is not a true synonym) is given in parenthesis. Where two or more genera are included under a single new name, as in *Piptatherum*, the synonym is indicated by = sign, the other name by parenthesis. Beauvois' application of generic names is determined by the species illustrated. Species which Beauvois evidently did not know and which are not congeneric with the species figured he also included in many cases. The list will enable the agrostologist to check up generic names as used in the Essay.

Beauvois' statement that the Gramineae were in disorder was true. The arrangement of genera was most artificial. Most pre-Linnaean authors recognized the Gramineae as a natural order including grasses, sedges, and rushes, and sometimes other plants with grass-like leaves. In Linnaeus' Species Plantarum the grasses fall under seven classes, Monandria Monogynia, Diandria Digynia, Triandria Monogynia, Triandria Digynia (with 47 of the 58 genera), Hexandria Digynia, Monoecia Triandria, Polygamia Monoecia. Authors using the Linnaean system reduced this distribution more or less. Swartz[5] so departed from the system as to place all the grasses together under Triandria. Jussieu[6] in his natural arrangement of genera places Gramineae under Plantae Monocotyledones with an excellent description of the family. The arrangement of genera is much less unnatural than under the Linnaean system and much more natural than Beauvois' arrangement.

Beauvois seems not to have seen Moench's Methodus,[7] in which a new classification, based on the position of the stamens, instead of their number, is proposed. The grasses are distributed under four widely separated divisions.

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[2] Gramina incerti ordinis, pages 140–145, of the Essai, and plate 25.

[5] Prodr. Veg. Ind. Occ. 1788; Fl. Ind. Occ. 1. 1797.

[6] Gen. Pl. 1789.

[7] Meth. Pl. 1794.

Of the works dealing only with grasses the arrangement is also artificial. In Schreber's work [8] the genera are not arranged in any order. In Koeler [9] there are keys to genera and species in the form of tables. The arrangement is, in many parts, a close approach to a natural one, though in some cases closely allied genera are widely separated.

The genera in the following list are arranged under the tribes and in the sequence used in the Gramineae in the United States National Herbarium. This, with relatively few exceptions, is that of Hackel's [10] arrangement in Engler and Prantl's Pflanzenfamilien.

TRIPSACEAE.

Zea.
Tripsacum.
Coix.
Dimeria.

ANDROPOGONEAE.

Imperata.
Saccharum.
Eriochrysis.
Erianthus.
Pogonatherum.
Apluda (Anadelphia).
Calamina=Apluda.
Diectomis (Apluda).
Ischaemum.
Colladoa=Ischaemum.
Meoschium=Ischaemum.
Sehima=Ischaemum.
Lodicularia=Manisuris.
Peltophorus=Manisuris.
Rottboëlla=Manisuris.
Manisuris (Rytilix).
Ophiurus.
Elyonurus.
Arthraxon.
Andropogon.
Cymbachne (?Andropogon).
Anatherum=Andropogon.
Sorghum=Holcus.
Raphis (error for Rhaphis).
Heteropogon.
Themeda.
Anthistiria=Themeda.

NAZIEAE.

Trachis (error for Trachys).
Anthephora.
Aegopogon.
Tragus=Nazia.
Neurachne.
Perotis.
Zoysia=Osterdamia.

MELINIDEAE.

Melinis.

PANICEAE.

Anthaenantia.
Digitaria (Syntherisma).
Monachne=?Eriochloa.
Axonopus.
Paspalum.
Reimaria=Paspalum (Reimarochloa).
Ceresia=Paspalum.
Panicum.
Streptostachys (=abnormal Panicum).
Urochloa=Panicum.
Ichnanthus.
Hymenachne.
Isachne.
Oplismenus.
Echinochloa.
Setaria=Chaetochloa.
Chamaeraphis.
Paractaenum.
Pennisetum.

[8] Beschr. Gräs. 1769.

[9] Descr. Gram. 1802.

[10] Professor Hackel, in conversation with the writer and in letters, explained that his arrangement was tentative only. He hoped further study would result in a more natural order. Oryzeae, particularly, he regarded as an artificial tribe.

Gymnotrix=Pennisetum.
Penicillaria=Pennisetum.
Cenchrus.
Xerochloa.
Thuarea.
Olyra.
Lithachne.
Spinifex.

ORYZEAE.

Oryza.
Asprella=Homalocenchrus.
Pharus.
Leptaspis.
Lygeum.

ZIZANIEAE.

Hydrochloa.
Luziola.
Zizania.
Potamophila.

PHALARIDEAE.

Ehrartha (error for Ehrharta).
Trochera=Ehrharta.
Microlaena.
Tetrarrhena.
Phalaris.
Anthoxanthum.
Hierochloa=Torresia.
Torezia (error for Torresia).

AGROSTIDEAE.

Aristida.
Arthratherum=Aristida.
Chaetaria=Aristida.
Curtopogon=Aristida.
Streptachne.
Stipa.
Achnatherum=Stipa.
Oryzopsis.
Milium.
Piptatherum=Oryzopsis (Eriochloa).
Muhlenbergia.
Clomena=Muhlenbergia.
Podosemum=Muhlenbergia.
Brachyelytrum.
Cornucopiae.
Crypsis.
Heleochloa.
Phleum.
Achnodonton=Phleum.
Chilochloa=Phleum.
Alopecurus.
Colobachne=Alopecurus.
Mibora.
Sporobolus.
Vilfa=Agrostis (Sporobolus, Muhlenbergia, and others).
Chaeturus.
Polypogon.
Cinna.
Agrostis.
Agraulus=Agrostis.
Apera=Agrostis.
Trichodium=Agrostis.
Gastridium.
Calamagrostis.
Deyeuxia=Calamagrostis.
Psamma=Ammophila.
Dipogonia=Diplopogon.
Pentapogon.
Lagurus.

AVENEAE.

Holcus (Notholcus).
Eriachne.
Achneria=Eriachne.
Coelachne.
Airopsis.
Aira (Aspris).
Corynephorus=Weingartneria.
Deschampsia=Aira.
Trisetum.
Graphephorum=Trisetum.
Trichaeta=Trisetum.
Koeleria.
Avena.
Arrhenatherum.
Gaudinia.
Anisopogon.
Danthonia.
Pentameris.

CHLORIDEAE.

Microchloa.
Cynodon=Capriola.
Spartina.
Campulosus.
Chloris.
Gymnopogon.
Bouteloua.
Chondrosium=Bouteloua.
Triathera=Bouteloua.
Dineba=Dinebra (Bouteloua).
Beckmannia.
Eleusine.
Dactyloctenium.

Leptochloa.
Diplachne=Leptochloa.
Rabdochloa=Leptochloa.

FESTUCEAE.

Pappophorum.
Enneapogon.
Pommereulla.
Triraphis.
Echinaria.
Sesleria.
Elytrophorus.
Gynerium.
Donax=Arundo.
Arundo (Phragmites).
Trichoon=Phragmites.
Triodia.
Tricuspis=Triodia.
Triplasis.
Molinia.
Eragrostis.
Megastachya=Centotheca (Eragrostis).
Catabrosa.
Ectrosia.
Melica.
Diarrhena=Diarina.
Centotheca.
Zeugites=Senites.
Orthoclada.
Streptogyne.
Uniola.
Briza.
Calotheca=Briza.
Dactylis.
Cynosurus.
Chrysurus=Achyrodes.
Sclerochloa.
Schismus.
Poa.
Glyceria=Panicularia.
Festuca.
Schenodorus=Festuca.
Bromus.
Ceratochloa=Bromus.
Brachypodium.

HORDEAE.

Nardus.
Lolium.
Lepturus.
Monerma=Pholiurus.
Agropyron.
Secale.
Aegylops=Triticum.
Triticum.
Hordeum.
Zeocriton=Hordeum.
Elymus.
Pariana.

BAMBOSEAE.

Arundinaria.
Nastus.
Stemmatospermum=Nastus.

Bambusa=Bambos.
Diaphora (a sedge).
Remirea (a sedge).

METHODS OF WORK.

In the present study the authors have had two main objects in view. (1) To typify the new genera proposed by Beauvois and to identify them. The descriptions of the new genera are translated, details of the lodicules, stamens, ovary, etc., being omitted. The selection of the type species is explained in each case. (2) To find the basis of the new combinations, which are mostly made in the index, and so far as possible to identify the species. The basis name has been ascertained in various ways: (a) The name with its author may be cited under the genus or referred in the index to the genus in question. (Example: *Diplachne fascicularis* (Lam.) Beauv., based on "*Festuca fascicularis* Lam.," cited under the genus.) (b) The name may be cited without its author, but the genus from which the species are transferred is cited with its author under the genus. (Example: *Asprella hexandra* (Swartz) Beauv., based on

Leersia hexandrus Swartz, "*Leersia* Sw., Wild., Pers., etc.," being cited under *Asprella*, and *L. hexandra* being one of Swartz's species.) The statement "based on" indicates one of these two cases. Besides these we have ascertained the basis-name (c) when an incorrect authority is given, but when reference to the work of the author cited shows the original author. (Example: *Deyeuxia acutiflora* Beauv. Beauvois cites "*Arundo acutiflora* Wild.," but in one of Willdenow's works we find *Arundo acutiflora* Schrad. This name is, therefore, taken as the basis of *Deyeuxia acutiflora* (Schrad.) Beauv.) More complicated cases are explained individually.

Since most of these transfers were made without knowledge of the plants, many of the new binomials do not belong in the genus to which they were transferred. The queries in the index are found to have little significance. They are placed not only after new combinations, but after old species names. They probably indicate that Beauvois did not know the species so marked. In a few cases a name is transferred to two genera, as *Leersia lenticularis* Michx. transferred to *Asprella* and to *Zizania*. The identification of these older names, upon which Beauvois' names are based, has been arrived at as follows: (a) By reference to records in the Grass Herbarium of type specimens examined (this includes a large part of the American species); (b) by referring the species in question to its typonym under the genus in which we place it, for example, *Saccharum japonicum* Thunb.=*Miscanthus japonicus* (Thunb.) Anderss.; (*c*) by study of the original description compared with the material in the Grass Herbarium. The names to which Beauvois' species are referred are not necessarily valid; they are the names that in our present state of knowledge appear to be the correct ones, and that are in current use in the Grass Herbarium.

The statement "genus valid," or "valid" after a species name means only that these genera and names are accepted as valid at present in the Grass Herbarium. Some names we are not able to place precisely, or we find that the name has not been transferred to the accepted genus. This is true of several species of *Calamagrostis*. In so perplexing a group we do not wish to make new combinations that later may prove to be invalidated by older names.

In May, 1923, Mrs. Chase visited the Delessert Herbarium in Geneva, where Beauvois' herbarium is now preserved. The specimens mostly consist of fragments evidently obtained from various herbaria. Most of them are without data or with but a word or two, as "humb" [Humboldt], "de Jussieu," or "ex Gay." Many of the sheets contain names and diagnosis in Beauvois' script, but relatively few of them agree with the Essay. A specimen of

Axonopus compressus (Swartz) Beauv., for example, is marked "Paspalum–humb[oldt]" only. There is little that aids in the interpretation of the names in the Essay. There are several good specimens collected by Beauvois in Africa, the types of his Flore d' Oware et Benin, but the rest of the herbarium must be the material Beauvois was bringing together for use in preparing the larger work planned (see page 137).

The Essay seems to be based on but a small number of actual plants. In many cases, probably, Beauvois had only the specimen or fragment he secured for illustrating the genus. In some cases, as in *Ichnanthus* and *Diectomis*, he obviously described the illustration, the description containing inaccuracies found in the illustration.

GENERA OF THE NEW AGROSTOLOGY.

[The genera are here given in the order used by Beauvois. Only genera in which there are new combinations are included. The other genera included by Beauvois may be found by reference to the Tabula Methodica and the rearrangement of genera following. All the pages containing names or references which aid in fixing the basis of his names are cited in each case.]

GEN. II. ASPRELLA Schreb.

Asprella hexandra Beauv. 2, 153, 166. Based on *Leersia hexandra* Swartz=*Homalocenchrus hexandrus* (Swartz) Kuntze.

Asprella lenticularis Beauv. 2, 153, *pl. 3. f. 1.* Based on *Leersia lenticularis* "Wild. Pers." Persoon[11] gives Michaux as author.=*Homalocenchrus lenticularis* (Michx.) Kuntze.

Asprella monandra Beauv. 2, 153, 166. Based on *Leersia monandra* Swartz=*Homalocenchrus monandrus* (Swartz) Kuntze.

Asprella oryzoides Beauv. 2, 153, 172. *pl. 4. f. 2.* Based on *Phalaris oryzoides* L.=*Homalocenchrus oryzoides* (L.) Poll.

Asprella virginica Beauv. 2, 153. Based on *Leersia virginica* Willd.=*Homalocenchrus virginicus* (Willd.) Britton.

The earlier name *Homalocenchrus* is rejected by Beauvois as less apt than *Asprella* Schreb.

GEN. IV. ALOPECURUS L.

Alopecurus alpestris Beauv. Atlas *pl. 1. f. 1; pl. 3. f. 19.* This name is not given in the text. It may be an error for "*agrestis*" which is there listed. The figure on plate 1 represents a loosely flowered panicle of *A. agrestis* L. Figure 19, plate 3, shows the glumes of a different species, with long-ciliate keels, probably *A. pratensis* L. In the explanation the figure is called *Alopecurus alpestris.* Plate 1, figure 1 is taken as the type=*A. agrestis* L.

Alopecurus granulatus Beauv. 4, 149. Name only.

Alopecurus pedalis "Bosc mss."; Beauv. 4. Name only.

Alopecurus phleiformis Beauv. 4. Name only.

Alopecurus sericeus Beauv. 4, 150. "New species communicated by Jussieu." In the index "Lam." is given as author. Lamarck[12] gives Gaertner

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[11] Syn. Pl. 1: 73. 1805.

[12] Tabl. Encycl. 1: 168. 1791; Encycl. 8: 772. 1808.

as author. Gaertner's description and illustration[13] identify the species as *A. pratensis* L.

AGRAULUS Beauv.[14]

"Inflorescence[15] paniculate; panicle compound, more or less effuse; glumes longer than the floret; lemma emarginate at apex, awned from below the middle; awn plicate, twisted."

Agraulus caninus, the species figured, is taken as the type=*Agrostis* L.

Agraulus alpinus Beauv. 5, 146. "*Agrostis alpina Lin.*" is referred to *Agraulus*. Probably *Agrostis alpina* Scop. given by Willdenow[16] was intended. That is valid in *Agrostis*.

Agraulus caninus Beauv. 5, 146, 147. *pl. 3. f. 2; pl. 4. f. 7.* Based on *Agrostis canina* L. The figure on plate 3 represents a spikelet, and that on plate 4, a panicle and a dissected spikelet. Valid in *Agrostis*.

GEN. V. TRICHODIUM [Michx.].

Trichodium elegans Leers; Beauv. 5, 147, 179. "*Agrostis elegans* Leers. Poir." The name is not found in Leers' work. Poiret[17] gives Thore as author. That is invalidated by *A. elegans* Salisb., 1796. It appears to be the same as *Agrostis tenerrima* Trin.

Perotis is misspelled *Perostis* (p. 5). This is corrected in Errata, but the misspelled name has crept into synonymy. *Perotis latifolia* Ait. is misspelled "*laxifolia*" (p. 6). This is also corrected in Errata.

GEN. VII. SACCHARUM L.

Saccharum bifarium Forsk.; Beauv. 177. Referred to *Imperata*. Error for *S. biflorum* Forsk. That is referred by Hackel[18] to *S. spontaneum* γ *aegyptiacum* (Willd.) Hack.

Saccharum brevibarbe "Michx."; Beauv. 177. Referred to *Erianthus*. Error for *S. brevibarbe* Pers. (based on *Erianthus brevibarbis* Michx.). Valid in *Erianthus*.

GEN. VIII. IMPERATA Cyrill.

Imperata cylindrica Beauv. 8, 165, 166, 177. *pl. 5. f. 1.* Based on *Lagurus cylindricus* L. In the Beauvois Herbarium is a specimen of this species labeled in Beauvois' script "*Saccharum cylindricum*, de Jaum. St. Hilare." Valid.

Imperata kaenigii [koenigii] Pers.; Beauv. 165, 177. Based on *Saccharum koenigii* Retz. In Persoon's Synopsis[19] *Saccharum koenigii* Retz. is placed under Section *Imperata*=a form of *Imperata cylindrica* (L.) Beauv.

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[13] Fruct. Sem. 1: 2. *pl. l. f. 2.* 1788.

[14] See Beauvois' statement that his proposed genera are left without number (page 40).

[15] The term used by Beauvois is axis, but as explained in the glossary (page lxiv) this refers to what we term inflorescence.

[16] Sp. Pl. 1: 368. 1797.

[17] Lam. Encycl. Suppl. 1: 255. 1810.

[18] DC. Monogr. Phan. 6: 115. 1889.

[19] Syn. Pl. 1: 103. 1805.

Imperata spontanea Beauv. 8, 165. Based on *Saccharum spontaneum* L. Valid in *Saccharum.*

Imperata thunbergii Beauv. 165. Name only. (*Saccharum thunbergii* Retz. is referred, page 177, to *Imperata cylindrica.*)

ERIOCHRYSIS Beauv.

"Inflorescence paniculate; panicle contracted, somewhat spikelike; spikelets in pairs or in threes; glumes villous, subobtuse, coriaceous-indurate, longer than the membranaceous lemma and palea."

Eriochrysis cayanensis, illustrated, is the type.

Eriochrysis cayanensis Beauv. 8, *pl. 4. f. 11.* "I have found this beautiful plant in nearly all the herbaria I have examined. I have a specimen from M. de Lessert." No locality is mentioned. In the Beauvois Herbarium is a fragmentary specimen named "*Eriochrysis*" in Beauvois' script. There is a diagnosis and an envelope marked "porto rico." The name suggests that Beauvois had seen a specimen from French Guiana. The figure shows a panicle, branch, and spikelet.

Eriochrysis pulchra Beauv. 162. Name only.

GEN. IX. CERESIA Pers.

Ceresia membranacea Beauv. 9. 171. *pl. 5. f. 4.* "*Paspalum membranaceum* Lin." is referred to *Ceresia.* "Lin." is probably an error for Lam. The figure referred to shows a raceme with broad-winged rachis and a spikelet with long pubescence. It was probably drawn from *Paspalum membranaceum* Lam..[20] not Walt. In Beauvois' herbarium there is a specimen of this species marked "Ceresia" in Beauvois' script. Lamarck's specimen, from Peru, was examined in the Paris Herbarium. *Ceresia elegans* Pers.,[21] *Paspalum elegans* Roem. & Schult.,[22] not Flügge, and *Panicum ceresia* Kuntze[23] are all based on *Paspalum membranaceum* Lam., which has heretofore lacked a tenable name=**Paspalum ceresia** (Kuntze) Chase.

GEN. X. PASPALUM L.

Paspalum brevisetum Flügge; Beauv. 10, 171. Name only. Possibly *Paspalum brevifolium* Flügge (=*Syntherisma longiflora* (Retz.) Skeels) was intended.

Paspalum frumentaceum Rottb.; Beauv. 10, 171. A name only, probably found in herbaria, for Roemer and Schultes[24] cite it as a synonym of *Paspalum scrobiculatum* L., and Hooker[25] refers to it as a cultivated form. Stapf[26] publishes *P. scrobiculatum* var. *frumentaceum* and explains that this is the original *P. frumentaceum* of Linnaeus=*Paspalum frumentaceum* L.

Paspalum lanuginosum "Bosc mss."; Beauv. 12. Name only.

Paspalum subarticulatum Beauv. 11. Name only.

Paspalum venustum Swartz; Beauv. 11, 172. Name only.

AXONOPUS Beauv. 12.

"Axis digitate; racemes simple, the spikelets on one side, etc., the other characters as in the preceding [*Paspalum* and *Ceresia*]." There is no illustration.

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[20] Tabl. Encycl. 1: 177. 1791.
[21] Syn. Pl. 1: 85. 1805.
[22] Syst. Veg. 2: 290. 1817.
[23] Rev. Gen. Pl. 3²: 360. 1898.
[24] Syst. Veg. 2: 296. 1817.
[25] Fl. Brit. Ind. 7: 11. 1896.
[26] Prain, Fl. Trop. Afr. 9: 575. 1919.

Axonopus compressus is selected as the type of the genus because the spikelets being solitary and sessile the racemes are more truly simple than in the species of *Syntherisma* included. The floret of *Milium cimicinum* is awned, hence that species can be excluded, since it does not agree with the key characters given in the Tabula Methodica. *Axonopus aureus*, having been received after the work was finished, was not considered in establishing the genus. Genus valid.

Axonopus aureus Beauv. 12, 154. "After this work was finished, I owe to the generosity of M. de Lessert a plant in which the spikelets are provided at the base with golden hairs in the form of an involucre." This is all there is by way of description of this species. This "points conclusively to one of the species with a cluster of golden hairs subtending the spikelets, these having a narrow rachis, not a broad one in which the spikelets are sunken as in *A. chrysoblepharis*. Following Trinius (Gram. Icon. 1: *pl. 97.* 1828) we take the common species with the smaller and glabrous spikelets to be the true *A. aureus.*[27] Valid.

Axonopus compressus Beauv. 12, 154, 167. Based on *Milium compressum* Swartz. Valid.

Axonopus digitatus Beauv. 12, 154, 167. Based on *Milium digitatum* Swartz=*Syntherisma digitata* (Swartz) Hitchc.

Axonopus cimicinus Beauv. 12, 154, 167. Based on *Milium cimicinum* L.=*Coridochloa cimicina* (L.) Nees.[28]

Axonopus paniceus Beauv. 12, 154, 168. Based on *Milium paniceum* Swartz=*Syntherisma panicea* (Swartz) Nash.

Beauvois observes "This genus differs from the two preceding and the following [*Milium*] only in the aspect and form of the axis of inflorescence. If *Milium* can be separated from *Paspalum*, because the inflorescence of the latter is a spike, composed of spikelets alternate or paired, the same characters should distinguish *Axonopus* in which the inflorescence is digitate; at least if one does not care to reunite the three genera, each forming a division of the single genus, which would, perhaps, be the most natural. It is for botanists to decide: it suffices for me to present my doubts." The character of reversed spikelets in *A. compressus* and *A. aureus* was not noted.

GEN. XI. MILIUM L.

Milium elegans Beauv. 18, 168. Name only, cited (as "sp. nov.") under *Piptatherum.*

Milium hirsutum Beauv. 13. *pl 5. f. 5.* The illustration is recognizable as *Valota insularis* (L.) Chase. Beauvois observes that this species might constitute another genus.

GEN. XII. ERIANTHUS Michx.

Erianthus aureus Beauv. 14, 150, 162. Based on *Andropogon aureus* Bory. Beauvois gives Willdenow as the authority on page 14, but "Bor. St.-Vin." on page 150=*Eulalia aurea* (Bory) Kunth.

Erianthus japonicus Beauv. 14, 162, 177. Based on *Saccharum japonicum* Thunb.=*Miscanthus japonicus* (Thunb.) Anderss.

Erianthus ravennae Beauv. 14, 151, 162. Based on *Andropogon ravennae* L. Valid.

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[27] Chase, Proc. Biol. Soc. Washington **24**: 135. 1911.

[28] See Chase, Proc. Biol. Soc. Washington **24**: 157. 1911.

Erianthus repens Beauv. 14, 162, 177. Based on *Saccharum repens* Willd. A species of *Tricholaena*.

GEN. XIII. CALAMAGROSTIS Adans.

Calamagrostis canadensis Beauv. 15, 152, 157. This is presumably based on *Arundo canadensis* Michx.; no authority is given for this name, which is referred to *Calamagrostis*. Valid.

Calamagrostis confinis Beauv. 15, 152, 157. Based on *Arundo confinis* Willd. The name was again transferred to *Calamagrostis* by Nuttall.[29] This species, described from "America boreali," has not yet been identified.

Calamagrostis halleriana Beauv. 15, 152, 157. *Arundo halleriana* without author is referred to *Calamagrostis*. *Arundo halleriana* Gaudin, based on *A. calamagrostis* Hall., not L., is doubtless intended.=*Calamagrostis villosa* (Chaix) Mutel.

Calamagrostis littorea Beauv. 15, 152, 157. "*Arundo littorea* Wild." is referred to *Calamagrostis*. Willdenow[30] gives Schrader as author. This is referred by Ascherson and Graebner[31] to *Calamagrostis pseudophragmites* (Hall.) Baumg.

GEN. XV. VILFA Adans.

The type of *Vilfa* Adans. is *Agrostis stolonifera* L., the only species referred to[32] by Adanson.

Vilfa aemula Beauv. 16, 146, 181. Based on *Agrostis aemula* R. Br.=*Agrostis retrofracta* Willd.

Vilfa africana Beauv. 16, 146, 181. Based on *Agrostis africana*, no authority given, presumably Poiret. Probably *Sporobolus elongatus* R. Br.

Vilfa alba Beauv. 16, 146, 181. Based on *Agrostis alba* L.[33]

Vilfa alopecuroides Beauv. 16, 146, 181. Based on *Agrostis alopecuroides* Lam.=*Polypogon monspeliensis* (L.) Desf.

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[29] Gen. Pl. **1**: 47. 1818.

[30] Enum. Pl. 127. 1809.

[31] Syn. Mitteleur. Fl. **2**: 216. 1899.

[32] See Hitchcock, Genera of Grasses of the United States, U. S. Dept. Agr. Bull. **772**: 127. 1920, for discussion of type.

[33] The name *Agrostis alba* L. (Sp. Pl. 63. 1753) is of doubtful application. In the original publication the name is founded solely on the citation "Roy. lugdb. 59" (Royen, Flora Leydensis). The Royen citation refers to *Poa* (apparently *P. nemoralis*). There are several sheets in Linnaeus' herbarium, one of which bears the name *Agrostis alba*, in Linnaeus' script. These specimens belong to the species generally called *Agrostis alba*, but, according to Jackson (Index to the Linnaean Herbarium, Proc. Linn. Soc. London, 124th Sess. Suppl. 1912), these specimens were added to the herbarium after 1753 and can not, therefore, have weight in determining the original application of the name. Linnaeus did not refer, under *Agrostis alba*, to his flora of Sweden. It would appear that he did not intend to apply the name originally to a Swedish plant. The species usually known as *Agrostis alba* is common in Sweden, but apparently was included by Linnaeus under *A. stolonifera*, to which it is closely allied. It was not until later that he applied the name to the species as now represented in his herbarium. Under these circumstances it seems best to drop the name *Agrostis alba*, as has been done by Piper (U. S. Dept. Agr. Bull. **692**, 1918) and by Stapf, as indicated in a letter to Piper.—Hitchcock, U. S. Dept. Agr. Bull. **772**: 128. 1920.

Vilfa arachnoïdea Beauv. 147, 181. Based on *Agrostis arachnoidea* Poir.= *Muhlenbergia capillaris* (Lam.) Trin.

Vilfa articulata Beauv. 16, 147, 181. Based on *Agrostis articulata* Poir. (Published as new by Poiret, but probably the same as *A. articulata* Brot., which is *Chaeturus fasciculata* Link.)

Vilfa aspera Beauv. 16, 147, 181. Based on *Agrostis aspera* Michx.= *Sporobolus asper* (Michx.) Kunth.

Vilfa australis Beauv. 16, 147, 181. Based on *Agrostis australis* [L. misapplied by] Lam. Lamarck gives Linnaeus as author and quotes his diagnosis, but adds a description which seems to apply to some species of *Calamagrostis*. Beauvois distinguishes the species to which Lamarck applied the name from the Linnaean species, which he refers to *Gastridium*.

Vilfa barbata Beauv. 16, 147, 181. Based on *Agrostis barbata* Pers. Persoon [34] cites *A. littoralis* Lam. and quotes Lamarck's diagnosis=*Sporobolus littoralis* (Lam.) Kunth.

Vilfa billardierii Beauv. 16, 147, 181, Based on *Agrostis billardieri* R. Br.= *Calamagrostis billardieri* (R. Br.) Steud.

Vilfa capensis Beauv. 16, 147, 181. Based on "*Agrostis capensis* Thunb." Presumably an error for *A. capensis* Willd. Under that species Willdenow cites "*Agrostis spicata* Thunb." and explains that the name must be changed because there is already a species of that name=*Sporobolus capensis* (Willd.) Kunth, which is probably the same as *S. elongatus* R. Br.

Vilfa ciliata Beauv. 16, 147, 181. "*Agrostis ciliata* Lin." is referred to *Vilfa*. The only publication of *A. ciliata* previous to Beauvois is by Thunberg. *Festuca thunbergii* Kunth and *Agrostis thunbergii* Steud. are based on this name. This Japanese species has not been identified. From the description it appears to be a species of *Agrostis*.

Vilfa coarctata Beauv. 16, 147, 181. Based on *Agrostis coarctata* Ehrh. Beauvois gives Koeler as authority for this, but Koeler [35] cites Ehrhart as author. A form of *Agrostis stolonifera* L.

Vilfa composita Beauv. 16, 147, 181. Based on *Agrostis composita* Poir. This is the basis of *Sporobolus compositus* (Poir.) Merr. Probably=*Sporobolus asper* (Michx.) Kunth.

Vilfa compressa Beauv. 16, 147, 181. Based on *Agrostis compressa* Willd. A form of *Agrostis stolonifera* L.

Vilfa coromandelina Beauv. 16, 147, 181. Based on *Agrostis coromandelina* Retz. [error for *coromandeliana* Retz.]=*Sporobolus coromandelianus* (Retz.) Kunth.

Vilfa crinita Beauv. 16, 147, 181. Name only. "*Agrostis crinita* Lam." is referred to *Vilfa*. There is no species of this name in Lamarck's works. *Agrostis crinita* Moench is referred to *Polypogon*, and *A. crinita* R. Br. to *Apera*.

Vilfa cruciata Beauv. 16, 181. Name only. *Agrostis cruciata*, without authority, is listed under *Vilfa*, but on page 147 *Agrostis cruciata* L. (the only "*cruciata*" in the list, is referred to *Chloris*.

Vilfa cylindrica Beauv. 16, 147, 181. Based on *Agrostis cylindrica* R. Br.= *Deyeuxia cylindrica* (R. Br.) Benth., a species of *Calamagrostis*.

Vilfa debilis Beauv. 16, 147, 181. Based on *Agrostis debilis* Poir. Referred by Bentham [36] to *Deyeuxia forsteri* (Roem. & Schult.) Kunth, which is the same as *Agrostis retrofracta* Willd.

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[34] Syn. Pl. 1: 75. 1805.

[35] Descr. Gram. 99, 1802.

[36] Fl. Austral. 7: 579. 1878.

Vilfa decipiens Beauv. 16, 147, 181. Based on *Agrostis decipiens* R. Br. A species of *Calamagrostis.*

Vilfa decumbens Beauv. 16, 147, 181. Based on *Agrostis decumbens* Gaudin. A form allied to *A. stolonifera* L.

Vilfa densa Beauv. 16, 147, 181. "*Agrostis densa* Poir." is referred to *Vilfa.* Beauvois gives Poiret as authority for this but Poiret[87] credits the species to Marschall von Bieberstein=*A. verticillata* Vill.

Vilfa dispar Beauv. 16, 147, 181. Based on *Agrostis dispar* Michx.= *Agrostis palustris* Huds.

Vilfa dulcis Beauv. 16, 147, 181. Based on *Agrostis dulcis* Poir. Probably a form of *A. stolonifera* L.

Vilfa elongata Beauv. 16, 147, 181. Based on *Agrostis elongata* Lam. Probably *Sporobolus berteroanus* (Trin.) Hitchc. & Chase.

Vilfa frondosa Beauv. 16, 147, 181. "Agrostis frondosa Lin." is referred to *Vilfa.* This is evidently a mistake for *A. frondosa* Poir. This species, described from Germany, has not been identified. The description suggests *Muhlenbergia mexicana* (L.) Trin. If that, the specimen must have been from a botanic garden.

Vilfa gigantea Beauv. 16, 147, 181. Based on *Agrostis gigantea* Roth. A form of *A. stolonifera* L.

Vilfa hispida Beauv. 16, 147, 181. "*Agrostis hispida*" without author [presumably Willdenow] is referred to *Vilfa.* A form of *A. capillaris* L.

Vilfa hybrida Beauv. 16, 147, 181. Based on *Agrostis hybrida* Gaudin. A form of *A. canina* L.

Vilfa involuta Beauv. 16, 147, 181. Based on *Agrostis involuta* Poir. Valid in *Agrostis.*

Vilfa lateriflora Beauv. 16, 147, 181. Based on "*Agrostis laterifolia* Mich." [error for *lateriflora* Michx.]=*Muhlenbergia mexicana* (L.) Trin.

Vilfa lenta Beauv. 16, 147, 181. Based on *Agrostis lenta* Ait. Probably *Syntherisma longiflora* (Retz.) Skeels.

Vilfa linearis Beauv. 16, 147, 181. Based on *Agrostis linearis* Retz.= *Capriola dactylon* (L.) Kuntze.

Vilfa littoralis Beauv. 16, 147, 181. Based on *Agrostis littoralis* Lam.= *Sporobolus littoralis* (Lam.) Kunth.

Vilfa lobata Beauv. 16, 147, 181. Based on *Agrostis lobata* R. Br. A species of *Calamagrostis.*

Vilfa lutosa Beauv. 16, 148, 181. Based on *Agrostis lutosa* Poir.=*Polypogon lutosus* (Poir.) Hitchc.

Vilfa magellanica Beauv. 16, 148, 181. Based on *Agrostis magellanica* Lam. Valid in *Agrostis.*

Vilfa maritima Beauv. 16, 148, 181. Based on *Agrostis maritima* Lam. Valid in *Agrostis.*

Vilfa mexicana Beauv. 16, 148, 181. Based on *Agrostis mexicana* L.=*Muhlenbergia mexicana* (L.) Trin.

Vilfa montana Beauv. 16, 148, 181. Based on *Agrostis montana* R. Br.= *Deyeuxia montana* (R. Br.) Benth., a species of *Calamagrostis,* not *C. montana* Host (1809) nor DC. (1815).

Vilfa novae-hollandiae Beauv. 181. Name only.

Vilfa nutans Beauv. 16, 148, 181. Based on *Agrostis nutans* Poir. Described from South Carolina. The type has not been examined. The

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[87] Lam. Encycl. Suppl. 1: 256. 1810.

description applies well to *Panicum anceps* Michx. to which Poiret later[38] suggests it belongs.

Vilfa panicea Beauv. 16, 148, 182. Based on *Agrostis panicea* Lam.= *Gastridium ventricosum* (Gouan) Schinz & Thell.

Vilfa parviflora Beauv. 16, 148, 182. Based on *Agrostis parviflora* R. Br. Valid in *Agrostis*.

Vilfa patula Beauv. 16, 148, 182. Based on *Agrostis patula* Gaudin. A species allied to *A. stolonifera* L.

Vilfa pilosa Beauv. 16, 148, 182. "*Agrostis pilosa* Gaud." is referred to *Vilfa*. Gaudin[39] gives Schleicher as author. Referred by Ascherson and Graebner[40] to *Calamagrostis tenella* var. *mutica* Koch.

Vilfa plebeia Beauv. 16, 148, 182. Based on *Agrostis plebeia* R. Br.= *Calamagrostis plebeia* (R. Br.) Kuntze.

Vilfa procera Beauv. 16, 148, 182. Based on *Agrostis procera* Retz. "*Agrostis procera* R. Brow" and "*A. procera* Retz" are both referred to *Vilfa*. This name is not found in Robert Brown's work. *Thysanolaena procera* Jan. is based on *Agrostis procera* Retz.

Vilfa pumila Beauv. 16, 148, 182. Based on *Agrostis pumila* L. A species of *Agrostis*.

Vilfa pungens Beauv. 16, 148, 182. "*Agrostis pungens* Vahl" is referred to *Vilfa*. Vahl[41] gives Schreber as the authority=*Sporobolus pungens* (Schreb.) Kunth.

Vilfa purpurascens Beauv. 16, 182. Name only. *Agrostis purpurascens* without author is listed under *Vilfa* (page 16) but "*A. purpurascens* Sw." is referred (page 148) to *Sporobolus*.

Vilfa racemosa Beauv. 16, 148, 182. Based on *Agrostis racemosa* Michx.= *Muhlenbergia racemosa* (Michx.) B. S. P.

Vilfa rara Beauv. 16, 148, 182. Based on *Agrostis rara* R. Br.=*Dichelachne micrantha rara* (R. Br.) Domin.

Vilfa retrofracta (Willd.) Beauv. 16, 148, 182. Based on *Agrostis retrofracta* Willd. Valid in *Agrostis*.

Vilfa scabra Beauv. 16, 148, 182. "*Agrostis scabra* R. Brow." and "*A. scabra* Wild." are referred to *Vilfa*. Doubtless neither species was known to Beauvois. Willdenow's name, being the earlier, is taken as the basis of *Vilfa scabra* Beauv.=*Agrostis hiemalis* (Walt.) B. S. P. Robert Brown's species belongs in *Calamagrostis*.

Vilfa sciurea Beauv. 16, 148, 182. Based on *Agrostis sciurea* R. Br.= *Dichelachne sciurea* (R. Br.) Hook. f.

Vilfa setacea Beauv. 16, 148, 182. *Agrostis setacea* Poir. is referred to *Vilfa*. Poiret[42] gives this name, with Villars as author, as a doubtful variety under *A. rupestris* All. Referred by Ascherson and Graebner[43] to *A. rupestris* All.

Vilfa spicata Beauv. 16, 182. Name only. *Agrostis spicata* without author is listed under *Vilfa* on page 16. On page 148 "*Agrostis spicata* Vahl" is referred to "*Vilfa virginica* var." and "*Agrostis spicata* Thunb." to "*Vilfa capensis*." Neither of these species can therefore be taken as the basis of *Vilfa spicata*, which is best regarded as a name only.

Vilfa stellata Beauv. 16, 148, 182. Based on *Agrostis stellata* Willd.= *Capriola dactylon* (L.) Kuntze.

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[38] Lam. Encycl. Suppl. **4**: 282. 1816.
[39] Agrost. Helv. **1**: 75. 1811.
[40] Syn. Mitteleur. Fl. **2**: 199. 1899.
[41] Symb. Bot. **1**: 9. 1790.
[42] Lam. Encycl. Suppl. **1**: 247. 1810.
[43] Syn. Mitteleur. Fl. **2**: 189. 1899.

Vilfa stolonifera Beauv. 16, 148, 182. Based on *Agrostis stolonifera* L. Valid in *Agrostis.*

Vilfa sylvatica Beauv. 148, 182. "*Agrostis sylvatica* Lin." is referred to *Vilfa.* Linnaeus [44] cites Hudson as author.

Vilfa verticillata Beauv. 16, 148, 182. Based on *Agrostis verticillata* Vill. Valid in *Agrostis.*

Vilfa villarsii Beauv. 16, 148, 182. Based on *Agrostis villarsii* Poir.=*A. verticillata* Vill.

Vilfa vinealis Beauv. 148, 182. Name only. "*Agrostis vinealis* Lin." is referred to *Vilfa.* Linnaeus did not publish this name. *A. vinealis* Schreb. may have been intended. That is probably a form of *A. stolonifera* L.

Vilfa virginica Beauv. 16, 149, 182. Based on *Agrostis virginica* L.=*Sporobolus virginicus* (L.) Kunth.

Vilfa vulgaris Beauv. 16, *pl. 5. f. 8.* *Agrostis vulgaris* without author is listed under *Vilfa* and given in the Atlas. The illustration represents a panicle and spikelet which resemble those of *A. vulgaris* With. (=*A. capillaris* L.), except that the apex of the lemma shown is strongly 3-toothed.

GEN. XVI. POLYPOGON Desf.

Polypogon crinitus Willd.; Beauv. 17, 176. Name only, referred to *Polypogon monspeliensis.*

PIPTATHERUM Beauv. 17.

"Inflorescence paniculate; panicle open (fig. 10) or simple with alternate branches (fig. 11); glumes herbaceous, longer than the coriaceous-indurate lemma and palea; lemma awned from near the margin of the apex, the awn herbaceous, three-sided, readily falling; palea entire or obscurely 3-lobed."

Figure 10 represents *Oryzopsis coerulescens;* figure 11, *Eriochloa punctata.* A third species figured (see below) is *Oryzopsis paradoxa.* Since two of the three species figured belong in *Oryzopsis, Piptatherum* is referred to that genus, *Milium coerulescens* Desf., being taken as the type.

Piptatherum caerulescens Beauv. 18, 167, 173, *pl. 5, f. 10.* Based on *Milium coerulescens* Desf.=*Oryzopsis coerulescens* (Desf.) Hack.

Piptatherum elegans Beauv. 173. Name only.

Piptatherum multiflorum Beauv. 18, 168, 173. *Milium multiflorum* without author is referred to *Piptatherum.* Probably *M. multiflorum* Cav. was meant. That is *Oryzopsis miliacea* (L.) Benth. & Hook.

Piptatherum paradoxum Beauv. 18, 168, 173. *pl. 3. f. 34.* "*Milium paradoxum Schreb.*" is referred to *Piptatherum.* Schreber [45] cites Linnaeus as author. The figure is obviously intended for the Linnaean species=*Oryzopsis paradoxa* (L.) Nutt.

Piptatherum punctatum Beauv. 18, 168, 173. *pl. 5. f. 11.* Based on *Milium punctatum* L.=*Eriochloa punctata* (L.) Hamilt.

GEN. XVII. STIPA L.

Stipa jarava Beauv. 18, 19, 179. *pl. 6. f. 3.* "*Jarava,* Fl. Peruv." is cited under *Stipa.* The species published in Flora Peruviana is *Jarava ichu* Ruiz & Pav.=*Stipa ichu* (Ruiz & Pav.) Kunth.

Oryzopsis aspera Beauv. 19. Error for *O. asperifolia* Michx., correctly given in the index and in explanation of plate 6, figure 5.

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[44] Sp. Pl. ed. 2. 2: 1665. 1763.

[45] Beschr. Gräs. 2: 50. 1769.

ACHNATHERUM Beauv. 19.

"Inflorescence paniculate; panicle compound, lax; glumes longer than the membranaceous lemma and palea; lemma awned from near the margin at the apex, the awn not articulate, twisted, bent; palea entire, acute."

The only species figured is *A. calamagrostis*, which is therefore taken as the type. This is *Stipa calamagrostis* (L.) Wahlenb. (based on *Agrostis calamagrostis* L.), a species in which the articulation between the awn and the body of the lemma is obscure. The genus *Lasiagrostis* Link is based on the same species=*Stipa* L.

Achnatherum argenteum Beauv. 19, 146, 157. *Calamagrostis argentea*, without author, is referred to *Achnatherum*. "*Calamagrostidis* spec. Adans. Roth, Decand." is cited under *Achnatherum*. *Calamagrostis argentea* DC. is presumably the species intended. Ascherson and Graebner[46] refer this species to *Stipa calamagrostis* (L.) Wahl.

Achnatherum bromoides Beauv. 20, 146, 147. Based on *Agrostis bromoides* L.=*Stipa bromoides* (L.) Beck. The genus *Aristella* Bertol. is based on the same species.

Achnatherum calamagrostis Beauv. 20, 146. *pl. 6. f. 7.* Based on *Agrostis calamagrostis* L.=*Stipa calamagrostis* (L.) Wahl.

Achnatherum capense Beauv. 146, 167. Based on *Milium capense* L. *Agrostis capensis* Lam. is based on this. Munro[47] states that the specimen in the Linnaean Herbarium "is *Danthonia* (*Pentaschistis*) *papillosa* Nees or an allied species."

Achnatherum conspicuum Beauv. 20, 146, 152. Based on *Arundo conspicua* Forst. Valid in *Arundo* according to Cheeseman.[48]

Achnatherum hallerii Beauv. 146, 152. Based on *Arundo halleri* Willd. Referred by Ascherson and Graebner[49] to *Calamagrostis calamagrostis* (L.) Karst.

Achnatherum lanceolatum Beauv. 20, 146, 157. "*Arundo lanceolata* Koel." and "*Calamagrostis lanceolata* Décand." are referred to *Achnatherum*. There is no *Arundo lanceolata* published. In Koeler's work[50] *Calamagrostis lanceolata* Roth is given, with *Arundo calamagrostis* L. as a synonym. DeCandolle[51] gives Roth as author. *C. lanceolata* Roth is based on *Arundo calamagrostis* L.=*Calamagrostis calamagrostis* (L.) Karst.

Achnatherum miliaceum Beauv. 20, 146, 148. "*Agrostis miliacea* Gou." is referred to *Achnatherum*. Gouan[52] gives Linnaeus as author=*Oryzopsis miliacea* (L.) Benth. & Hook.

Achnatherum soboliferum Beauv. 20, 146, 148. "*Agrostis sobolifera* Wild." is referred to *Achnatherum*. Willdenow[53] gives Muhlenberg as author=*Muhlenbergia sobolifera* (Muhl.) Trin.

Achnatherum tenuifolium Beauv. 20, 146. Name only.

GASTRIDIUM Beauv. 21.

"Inflorescence paniculate; panicle compound, contracted, subspiciform; glumes ventricose at base, thrice as long as the subcoriaceous-indurate lemma and palea; lemma 3 or 4-toothed, bearing a bristle below the apex; palea 2-toothed."

Milium lendigerum L., the only species here cited, is the type.

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[46] Syn. Mitteleur. Fl. **2**: 115. 1899.
[47] Proc. Linn. Soc. Bot. **6**: 40. 1862.
[48] Man. New Zeal. Fl. 893. 1906.
[49] Syn. Mitteleur. Fl. **2**: 200. 1899.
[50] Descr. Gram. 103. 1802.
[51] Lam. & DC. Fl. Franç. **3**: 26. 1805.
[52] Illust. Obs. Bot. 3. 1773.
[53] Enum. Pl. **1**: 95. 1809.

Gastridium australe Beauv. 164. Atlas 6. *pl. 6. f. 6.* Presumably a change of name for *Milium lendigerum=Gastridium ventricosum* (Gouan) Schinz & Thell. In the index *Agrostis ventricosa* Gouan is doubtfully referred to *Gastridium.*

Gen. XIX. AGROSTIS L.

Agrostis acutiflora Beauv. 22, 146. Name only.

Agrostis myuros Lam.; Beauv. 49. Given as a synonym under *Hymenachne.* This must be an error for *Panicum myuros* Lam., which is *Sacciolepis myuros* (Lam.) Chase.

Agrostis Novae Hollandiae Beauv. 148. Name only.

Agrostis ravennae Beauv. 148. Name only, referred to *Erianthus,* probably an error for *Saccharum ravennae.*

COLOBACHNE Beauv. 22.

"Inflorescence spicate; spike compound, capitate; glumes unequal, subulate, a little longer than the floret; lemma 3-toothed and truncate at the apex, awned from near the base, the awn coriaceous, twisted and bent; palea entire, acute."

Polypogon vaginatum Willd., the only species cited, is the type.

Colobachne vaginata Beauv. 22, 158. *pl. 6. f. 9.* Based on *Polypogon vaginatum* Willd.=*Alopecurus vaginatus* (Willd.) Boiss. (Type of Section *Colobachne* including species of *Alopecurus* having a distinct palea).

Gen. XXII. HELEOCHLOA Host.

Heleochloa juncea Beauv. 24, 147. Based on *Agrostis juncea* Michx.=*Sporobolus junceus* (Michx.) Kunth.

Heleochloa phalaroides Beauv. 24, 173. *pl. 7. f. 2.* (Erroneously cited as *f. 3*). Based on *Phleum phalaroides* Koel.=*Phleum phleoides* (L.) Karst. (typonym).

Gen. XXIII. PHLEUM L.

Phleum asperum "Lin." [error for Jacq.] Beauv. 173. Referred to *Chilochloa.* Beauvois probably took the name from Willdenow[54] who cites "Schrad. germ. 1. p. 182." Schrader gives Jacquin as author.

Phleum thyphinum Lob.; Beauv. 173. Name only, referred to *Phleum nodosum* L. The pre-Linnaean name "Gramen typhinum Lobel" is doubtless what Beauvois had in mind.

Phleum velutinum Forsk.; Beauv. 173. Name only, referred to *Digitaria.*

ACHNODONTON Beauv. 24.

"Inflorescence paniculate; panicle simple, spikelike; glumes subequal, keeled, subobtuse, twice as long as the floret; lemma truncate, many-toothed, infolding the 2-toothed emarginate palea . . . Obs. The species of this genus approach those of *Phalaris* in their glumes and those of *Phleum* in their lemma and palea."

Achnodonton tenuis, the species figured, is taken as the type. This is *Phleum subulatum* (Savi) Aschers. & Graebn. (*P. tenue* (Host) Schrad.), a species in which the glumes are acute, not abruptly awned as in most species=*Phleum* L.

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[54] Enum. Pl. 1: 84. 1809.

Achnodonton bellardi Beauv. 25, 146, 173. "*Phleum bellardi* Lin." is cited under *Achnodonton*. This name was published first by Gmelin[55] for a species with ciliate glumes and subovate spike; and second by Willdenow[56] (based on *Phalaris bellardii* Willd. 1801), for a plant with cylindrical subspicate panicle and glumes with glabrous keels, characters belonging to *Phleum subulatum*. Willdenow cites *Phleum tenue* Schrad. and *Phalaris subulata* Savi as synonyms. Since Willdenow's species agrees with Beauvois' generic diagnosis and Gmelin's does not, it is probable that "Lin." is an error for Willd.=*Phleum subulatum* (Savi) Aschers. & Graebn.

Achnodonton tenuis Beauv. 25, 146, 173. *pl.* 7. *f.* 5. Based on *Phalaris tenuis* Host=*Phleum subulatum* (Savi) Aschers. & Graebn.

Gen. XXIV. SPARTINA Schreb.

Spartina fasciculata Beauv. 25, 159. "*Dactylis fasciculata* Willd." is referred to *Spartina*. Lamarck, not Willdenow, published the name. The species, described from tropical America, has not yet been identified. The description suggests *Spartina brasiliensis* Raddi.

Spartina geniculata Beauv. 25, 159, 178. Based on *Dactylis geniculata* Burm. We are unable to identify this species, but Burmann's plate shows that it does not belong in *Spartina*.

Spartina polystachya Beauv. 25, 178, 179. Presumably based on *Trachynotia polystachya* Michx., "*Trachynotia* Mich." without specific name being referred to *Spartina*=*Spartina cynosuroides* (L.) Roth.[57]

Spartina pungens Beauv. 25, 166. "*Limnetis* Pers." without specific name is referred to *Spartina*. Persoon states that Richard contributed the work on this genus. *Limnetis pungens* Rich.,[58] which must be taken as the basis of *S. pungens* Beauv., is based on *Spartina stricta* Roth.[59] Roth's name is based on *Dactylis stricta* Ait. *Spartina stricta* (Ait.) Roth was found by Fernald to be the same as *Dactylis maritima* Curtis, which was published two years earlier=*Spartina maritima* (Curt.) Fernald.

Gen. XXV. SPOROBOLUS R. Br.

Sporobolus diandrus Beauv. 26, 147. Based on *Agrostis diandra* Retz. Valid.

Sporobolus tenacissimus Beauv. 26, 148. Based on *Agrostis tenacissima* L. A species of *Sporobolus*.

Gen. XXVI. ORYZA L.

Oryza latifolia Beauv. 27, 168. Name only.
Oryza parviflora Beauv. 27, 168. Name only.

Muhlenbergia multiflora Pers.; Beauv. 168. Name only.

CLOMENA Beauv. 28.

"Inflorescence paniculate; panicle small, nearly simple; glumes nearly the length of the lemma and palea, the lower 3-toothed, the upper entire; lemma 2-toothed, with a bristle between the teeth."

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[55] Syst. Veg. ed. 13. 1: 166. 1791.
[56] Enum. Pl. 1: 85. 1809.
[57] See Hitchcock, Types of American Grasses, Contr. U. S. Nat. Herb. 12: 153. 1908.
[58] Pers. Syn. Pl. 1: 72. 1805.
[59] Neue Beytr. 1: 101. 1802.

Clomena peruviana Beauv., is the only species. (See below.)=*Muhlenbergia* Schreb.

Clomena peruviana Beauv. 28. *pl. 3. f. 20; pl. 7. f. 10.* "Pl. nouv. communiquée par M. Thibaut."=*Muhlenbergia peruviana* (Beauv.) Steud.

GEN. XXVIII. PODOSEMUM Desv.

Podosemum agrostideum Beauv. 176, 179. *pl. 8. f. 3.* Based on *Tosagris agrostidea* Beauv. (See below.)

Podosemum purpureum Beauv. 176, 179. *pl. 8. f. 2.* Based on *Trichochloa purpurea* Beauv. (See below.)

Beauvois appends to his description of *Podosemum* Desv., of which he figures the type species, *P. capillare* Desv. (*Muhlenbergia capillaris* (Lam.) Trin.), observations on two species which in the index he places under *Podosemum* (see the two species above). These plants, which he received from the United States of America, he says are closely related to *Podosemum*, but each has notable differences. "Provisionally and in order not to increase the number of new genera, which some, perhaps, find already too many," he includes the two in *Podosemum*. "However, on account of the principles I believe should be adopted for the Agrostographie, I can not avoid noting the distinguishing characters of these two plants, which seem to me sufficient to establish two distinct genera." Enough description is given of each, together with the figures, to constitute publication.

Trichochloa purpurea Beauv. 29. *pl. 8. f. 2.* "Differs essentially in the glumes without bristles but villous." (*Podosemum capillare* is shown in Plate 8, Figure 1, as having awned glumes. The figure was probably drawn from a specimen of *Muhlenbergia capillaris filipes* Chapm., which has minute glumes with delicate awns. The glumes in *M. capillaris* are exceedingly variable, ranging from one-third as long as the lemma and awnless or awn-tipped, to minute and short or long-awned.) Beauvois' specimen of *Trichochloa purpurea* has not been found. From Figure 2 it appears to be the same as *Muhlenbergia expansa* (DC.) Trin. DeCandolle[60] describes *Trichochloa* as a new genus, without reference to Beauvois, including *M. capillaris* and other awned species of *Muhlenbergia*.

Tosagris agrostidea Beauv. 29, *pl. 8. f. 3.* "Resembles *Podosemum* in the glumes and lemma, but the palea is entire.—It has the aspect of *Agrostis*, of which *Tosagris* is an anagram." Figure 3 shows a spikelet with short-awned glumes, a lemma hairy at base and with a 2-toothed long-awned apex, and a sharp-pointed palea. This appears to be an exaggeration of the minutely hairy base and obscurely 2-toothed apex of the lemma of *Muhlenbergia capillaris* (Lam.) Trin.

GEN. XXIX MIBORA Adans.

Mibora verna Beauv. 29, 167, 179. *pl. 8. f. 4.* Based on *Sturmia verna* Pers. "*Sturmia* Smith," [error for Hoppe] is referred to *Mibora*. "*Sturmia* Hop., Pers., Wild. etc.", is cited under Mibora=*Mibora minima* (L.) Desv.

CHAETARIA Beauv. 30.

"Inflorescence paniculate; panicle simple, lax; glumes membranaceous, often mucronate, longer than the floret; lemma convolute, the apex (sometimes elongate) bearing a bristle; bristle 3-parted; palea entire, acute."

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[60] Cat. Hort. Monsp. 151. 1813.

Two species are figured, *C. stricta*, based on *Aristida stricta* Michx., and *C. capillacea* (based on *Aristida capillacea* Lam.). Of these the first is taken as the type=*Aristida* L.

Chaetaria a[d]scensionis Beauv. 30, 151, 158. Based on *Aristida adscensionis* L. Valid in *Aristida*.

Chaetaria caerulescens Beauv. 30, 151, 158. Based on *Aristida caerulescens* Desf. Valid in *Aristida*.

Chaetaria calicina Beauv. 30, 151, 158. Based on *Aristida calycina* R. Br. Valid in *Aristida*.

Chaetaria canariensis Beauv. 30, 151, 158. Based on *Aristida canariensis* Willd. Referred by Boissier [61] to *A. caerulescens* Desf.

Chaetaria capensis Beauv. 30, 151, 158. Based on *Aristida capensis* Thunb. Valid in *Aristida*.

Chaetaria capillacea Beauv. 30, 158. On page 151 *Aristida capillacea* without author is referred to *Chaetaria*. Presumably Lamarck's species is intended. In the Atlas, Plate 8, Figure 6, is named *C. capillaris*, obviously an error for *capillacea*. Valid in *Aristida*.

Chaetaria capillaris Beauv. Atlas. 7. *pl. 8. f. 6.* Error for *capillacea*.

Chaetaria depressa Beauv. 30, 151, 158. Based on *Aristida depressa* Retz. A form of *A. adscensionis* L.

Chaetaria divaricata Beauv. 30, 151, 158. *Aristida divaricata* without author is referred to *Chaetaria*. *Aristida divaricata* Humb. & Bonpl. is doubtless intended. Valid in *Aristida*.

Chaetaria elatior Beauv. 30, 151, 158. Based on *Aristida elatior* Cav. A form of *A. adscensionis* L.

Chaetaria festucoides Beauv. 30, 152, 158. Based on *Aristida festucoides* Poir. Probably a form of *A. adscensionis* L.

Chaetaria furcata Beauv. 30, 158. Name only.

Chaetaria gigantea Beauv. 30, 152, 158. Based on *Aristida gigantea* L. Referred by Boissier [62] to *A. caerulescens* Desf.; basis of *A. adscensionis gigantea* (L.) Kuntze.

Chaetaria gossypina Beauv. 30, 152, 158. Name only. "*Aristida gossypina* Bosc mss." is referred to *Chaetaria*. This name was later published [63] credited to Beauvois, based on *Aristida lanata* Poir.=*A. lanosa* Muhl.

Chaetaria hystrix Beauv. 30, 152, 158. Based on *Aristida hystrix* L. Valid in *Aristida*.

Chaetaria interrupta Beauv. 30, 152, 158. Based on *Aristida interrupta* Cav. This Mexican species has not been identified.[64]

Chaetaria luzonensis Beauv. 30, 152, 158. Based on *Aristida luzon*[*i*]*ensis* Cav. (Merrill [65] says "Certainly not a Philippine species, but American or Australian.")

Chaetaria olygantha Beauv. 30, 152, 158. Based on *Aristida oligantha* Michx. Valid in *Aristida*.

Chaetaria pallens Beauv. 30, 152, 158. Based on *Aristida pallens* Cav. Valid in *Aristida*.

Chaetaria purpurascens Beauv. 30, 152, 158. *Aristida purpurascens* without author is referred to *Chaetaria*. Presumably Poiret's species was intended. Valid in *Aristida*.

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[61] Fl. Orient. **5**: 491. 1884.
[62] Fl. Orient. **5**: 491. 1884.
[63] Roem. & Schult. Syst. Veg. **2**: 391. 1817.
[64] See Hitchcock, Contr. U. S. Nat. Herb. **22**: 586. 1924.
[65] Enum. Philipp. Pl. **1**: 79. 1922.

Chaetaria racemosa Beauv. 30, 152, 158. Name only. "*Aristida racemosa* R. Brow." is referred to *Chaetaria*. There is no species of that name in Brown's work. It is probably an error for *A. ramosa* R. Br., which is also referred to *Chaetaria*. *Aristida racemosa* Spreng. might be the species intended, but Beauvois seems not to have had Sprengel's work; it is nowhere cited.

Chaetaria setacea Beauv. 30, 152, 158. Based on *Aristida setacea* Retz. Valid in *Aristida*.

Chaetaria stipaeformis Beauv. 30, 152, 158. Based on "*Aristida stipaeformis* Poir." Poiret[66] cites "*Aristida stipiformis* Lam. . . . . Ill. no. 781." No. 781 is *Aristida stipoides* Lam., the word "stipiforme" being given as the French common name=*Aristida stipoides* Lam.

Chaetaria stricta Beauv. 30, 152, 158. *pl. 8. f. 5.* Based on *Aristida stricta* Michx. Valid in *Aristida*.

Chaetaria teneriffae Beauv. 30, 158. Name only.

Chaetaria vestita Beauv. 30, 152, 158. Based on *Aristida vestita* Thunb. Valid in *Aristida*.

Gen. XXX. APERA Adans.

Apera aspera Beauv. 151. Name only.

Apera crinita Beauv. 31, 151. Based on *Anthoxanthum crinitum* L.= *Dichelachne crinita* (L.) Hook. f.

Apera interrupta Beauv. 31, 151. Based on *Agrostis interrupta* L. Valid in *Agrostis*.

Apera purpurea Beauv. 31, 151. Based on *Agrostis purpurea* Gaudin. A form of *Agrostis spica-venti* L., according to Ascherson and Graebner.[67]

Apera spica venti Beauv. 31, 151. *pl. 3. f. 33; pl. 7. f. 11.* Based on *Agrostis spica-venti* L. Valid in *Agrostis*.

Apera tenuiflora Beauv. 148, 151. Based on *Agrostis tenuiflora* Willd.= *Muhlenbergia tenuiflora* (Willd.) B. S. P.

Gen. XXXI. CINNA L.

Cinna mexicana Beauv. 32, 148, 158. Based on *Agrostis mexicana* L. Beauvois lists *Agrostis mexicana* L. under both *Vilfa* and *Cinna* in the text and in the index. In the text the name is queried under *Cinna*. *Agrostis mexicana* L. in the index is referred to *Vilfa=Muhlenbergia mexicana* (L.) Trin.

CURTOPOGON Beauv. 32.

"Inflorescence paniculate; panicle branching; glumes membranaceous, often mucronate, the length of the lemma; lemma convolute, the apex 2-cleft, with a bristle between the slender lobes; bristle subreflexed, flexuous; palea much shorter, entire." [It will be noted that the short lateral awns of *Aristida dichotoma* are regarded as the cleft apex of the lemma.]

Aristida dichotoma Michx., the only species included, is the type=*Aristida* L.

Curtopogon dichotomus Beauv. 32, 151, 159. *pl. 8. f. 7.* Based on *Aristida dichotoma* Michx. Valid in *Aristida*.

ARTHRATHERUM Beauv. 32.

"Inflorescence paniculate; panicle subcompound, lax; glumes membranaceous, often mucronate, the upper longer than the lemma; lemma naked or

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[66] Lam. Encycl. Suppl. **1**: 452. 1810. [67] Syn. Mitteleur. Fl. **2**: 196. 1899.

bearded, awned; awn 3-parted, articulated with the apex of the lemma, caducous."

Two species are figured, *A. hygrometricum* with an awn having a long twisted base, and *A. pungens* (*Aristida pungens* Desf.) with plumose awns, not twisted at base. The first is taken as the type=*Aristida* L. *Arthratherum* is commonly accepted as a section of *Aristida*, comprising the species having articulate awns.

Arthratherum hygrometricum Beauv. 33, 152. *pl. 8. f. 8.* Based on *Aristida hygrometrica* R. Br. Valid in *Aristida.*

Arthratherum pungens Beauv. 33, 152. *pl. 8. f. 9.* Based on *Aristida pungens* Desf. Valid in *Aristida.*

Arthratherum stipoides Beauv. 33, 152. Based on *Aristida stipoides* R. Br. Valid in *Aristida.*

GEN. XXXII. ARISTIDA L.

Beauvois' understanding of true *Aristida* is that the lemma bears two bristles with an awn between them. He says that of all the species he has seen in herbaria only *Aristida lanata* [Forsk.], in which the middle awn is of a different substance from the lateral ones, can be said to have a true awn [arista]. For this reason he conserves the name *Aristida* for that.

Aristida gossypina Bosc; Beauv. 30, 152. Name only. (See *Chaetaria gossypina* Bosc page 164).

Aristida subrecurvata Beauv. 152. Name only.

GEN. XXXV. PHALARIS L.

Phalaris boemerii Willd.; Beauv. 172. Name only, referred to *Chilochloa.* Probably error for *Phleum boehmeri* Wib.

Phalaris colorata Willd.; Beauv. 172. Willdenow[88] cites *Arundo colorata* "Sp. pl. ed. W. 1. p. 457." as synonym under *Phalaris arundinacea.* In Willdenow's edition of the Species Plantarum (page 457) *Arundo colorata* Ait. is given, with *Phalaris arundinacea* as synonym. *A. colorata* Ait. is based on *P. arundinacea* L., the later name valid.

Phalaris cuspidata Beauv. 37, 172. Name only, referred to *Chilochloa.*

Phalaris erucoides "Lin."; Beauv. 172. Referred to *Beckmannia.* Error for *P. erucaeformis* L.

Phalaris picta Beauv. 36, 172. Probably *P. arundinacea β picta* L. was intended though Linnaeus is not cited.

Phalaris pruinosa Lam.; Beauv. 173. Name only, referred to *Phalaris paradoxa.* Possibly an error for *P. praemorsa* Lam.

Phalaris semi-neutra Beauv. 149, 173. "*Aira semineutra* Wild." is referred to *Phalaris.* Willdenow[89] credits *Aira semineutra* to Waldstein and Kitaibel.

CHILOCHLOA Beauv. 37.

"Inflorescence spicate; spike compound, cylindric; glumes unequal, acute, often pilose on the back and margins, longer than the floret; lemma and palea subcartilaginous; rudiment of an abortive floret pedicellate, filiform; palea emarginate."

The species figured is called *C. michelii* in the Atlas. This name is not found in the Agrostographie itself. The figures of spikelet and floret do not agree with the above description. *Phalaris cuspidata,* the first of the five species cited under the genus, is a name only. The second, *Phalaris panicu-*

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[88] Enum. Pl. 1: 84. 1809.

[89] Enum. Pl. 1: 100. 1809.

lata, is queried in the index. The third, *Phleum arenarium* L., is therefore taken as the type=*Phleum* L.

Chilochloa is commonly recognized as a section of *Phleum* for *P. arenarium* and its allies in which the rachilla joint is prolonged beyond the palea as a minute stipe.

Chilochloa arenaria Beauv. 37, 158, 173. Based on *Phleum arenarium* L. Valid in *Phleum*.

Chilochloa aspera Beauv. 37, 158, 173. "Phalaris aspera Lin." is referred to *Chilochloa*. Willdenow[70] cites "Sp. Pl. ed. W. 1. 328" after *Phalaris aspera*. Beauvois seems to have assumed that Linnaeus is the author. In his edition of the Species Plantarum Willdenow gives Lamarck as author of *P. aspera=Phleum paniculatum* Huds.

Chilochloa boemerii Beauv. 37, 158, 173. Based on *Phleum boë[h]meri* Wib. This is based on *Phalaris phleoides* L.=*Phleum phleoides* (L.) Karst.

Chilochloa cuspidata Beauv. 37, 158, 172. Name only.

Chilochloa hispida Beauv. 158. Name only.

Chilochloa michelii Beauv. Atlas *pl. 7, f. 3.* (See above.) This is not based on *Phleum michelii*, which is listed under *Phleum;* nor is that represented by the figure, which we are unable to identify.

Chilochloa paniculata Beauv. 37, 158, 172. Based on "*Phalaris paniculata* Ait.," which is based on *Phleum paniculatum* Huds. Valid in *Phleum*.

Caelachne (page 38) is misspelling of *Coelachne* R. Br.

BRACHYELYTRUM Beauv. 39.

"Inflorescence spicate; spike simple; spikelets pedicellate, alternate; glumes unequal, shorter than the floret, the lower one-fourth as long; lemma of fertile floret terminating in a very long bristle; palea bifid; abortive floret rudimentary, pedicellate, pubescent, clavate."

Muhlenbergia erecta Schreb., the species figured, is the type. Genus valid.

Brachyelytrum erectum Beauv. 39, 155. *pl. 9. f. 2.* Based on *Muhlenbergia erecta* Schreb. Valid.

GEN. XXXVII. TRIATHERA Desv.

Triathera juncea Desv.; Beauv. 40. *pl. 9. f. 4=Bouteloua juncea* (Desv.) Hitchc. The source of the plant is not given. Desvaux[71] gives the habitat as Hispaniola.

GEN. XXXVIII. BOUTELOUA Lag.

Bouteloua melicoides Horn.; Beauv. 40, 155. *pl. 9. f. 6.* Doubtless an error for *B. melicaeformis* Brouss.; Hornem.=*B. curtipendula* (Michx.) Torr.

GEN. XXXIX. CHONDROS[I]UM Desv.

Chondros[i]um ciliatum Beauv. 41, 158. Name only.

Chondros[i]um humile Beauv. 41, 158. Name only. Later described by Kunth[72]=*Bouteloua simplex* Lag.

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[70] Enum. Pl. 1: 84. 1809.

[71] Journ. de Bot. Desv. 1: 67. 1813.

[72] H. B. K. Nov. Gen. & Sp. 1: 175. *pl. 56.* 1816.

Chondros[i]um procumbens Desv.; Beauv. 41, 158. *pl. 9. f. 7.* The source of the specimen is not given. Under the genus "*Chloridis* spec. Durand" is cited. The name is probably based on *Chloris procumbens* Durand. Desvaux [73] bases the genus on *Chloris procumbens* Durand=*Bouteloua procumbens* (Durand) Griff.

Chondros[i]um tenue Beauv. 41, 158. Name only. Later described by Kunth [74]=*Boutcloua procumbens* (Durand) Griff. Beauvois cites "*Actinochloa* Wild. mss." and "*Actinochloa tenuis, ciliata, humilis* Wild. mss." under *Chondrosium*, and states that they were given to him by Willdenow, during his visit to Paris, and that they were brought back by Humboldt and Bonpland. All are names only.

Actinochloa Willd.; Beauv. 41. Roemer and Schultes [75] describe *Actinochloa* Willd., reducing *Chondrosium* to a synonym of it.

Actinochloa tenuis Willd.; Beauv. 41. Published by Roemer and Schultes [76] =*Bouteloua procumbens* (Durand) Griff.

Actinochloa ciliata Willd.; Beauv. 41.

Actinochloa humilis Willd.; Beauv. 41. Published by Roemer and Schultes [77] =*Bouteloua simplex* Lag.

GYMNOPOGON Beauv. 41.

"Inflorescence paniculate; panicle simple, open; branches elongate, alternate; spikelets sessile, remote, alternate; glumes lanceolate, acute, longer than the floret; lemma of fertile floret bifid-dentate, bearing a bristle below the apex; abortive floret consisting of a rudimentary nerved plicate naked lemma."

Andropogon ambiguus Michx., the only species cited under the description, is the type. Genus valid.

Gymnopogon racemosus Beauv. 41, 164. *pl. 9. f. 3.* Evidently a change of name for *Andropogon ambiguus* Michx., with which the figure agrees=*G. ambiguus* (Michx.) B. S. P.

ECHINOPOGON Beauv. 42.

"Inflorescence paniculate; panicle simple, the branches congested into a small head; glumes acute, subequal, shorter than the floret; lemma of fertile floret bristle-bearing below the entire apex; palea bifido-dentate; abortive floret a pedicellate pilose clavate rudiment."

"*Agrostis ovata* Labill" [error for Forst., correctly given in the index], the only species included, is the type. Genus valid.

Echinopogon ovatus Beauv. 42, 148, 161, *pl. 9. f. 5.* Based on *Agrostis ovata* Forst. Valid.

GEN. XLI. DEYEUXIA Clar. Mss.; Beauv. 43.

"Inflorescence paniculate; panicle compound; glumes membranaceous, much longer than the floret; fertile floret lanuginose-pilose at base, the lemma and palea bifid-dentate, the lemma awned from the back above or below the middle; abortive floret a pedicellate rudiment, the pedicel filiform, pilose, subclavate, the "clava" bristle-bearing"

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[73] Nouv. Bull. Soc. Philom. Paris **2**: 188. 1810.
[74] H. B. K. Nov. Gen. & Sp. **1**: 176. *pl. 57.* 1816.
[75] Syst. Veg. **2**: 22, 417. 1817.
[76] Syst. Veg. **2**: 418. 1817.
[77] Syst. Veg. **2**: 417. 1817.

Deyeuxia montana Beauv., the first of the three species figured, is taken as the type. The figure of the floret agrees with the statement that the club-shaped pedicel bears a bristle. The structure shown is not found in any of the species of the genus. The drawing is doubtless due to faulty observation of the pencil of hairs at the tip of the rachilla joint=*Calamagrostis*, the section in which the rachilla joint is prolonged behind the palea. All the American species of *Calamagrostis* belong to this section. Maintained as valid by Pilger and others.

Deyeuxia acutiflora Beauv. 44, 152, 160. "*Arundo acutiflora* Wild." is referred to *Deyeuxia*. Willdenow[78] cites Schrader as author=*Calamagrostis acutiflora* (Schrad.) DC.

Deyeuxia airoides Beauv. 44, 152, 160. "*Arundo airoides* Mich. ined." is referred to *Deyeuxia*. *Arundo airoides* Lam. was described from a plant collected in North America by Michaux and is probably the species Beauvois had in mind. The species has not yet been identified. Lamarck's description suggests *Tristèum melicoides* (Michx.) Scribner, which was collected by Michaux and described by him as *Aira melicoides*.

Deyeuxia arundinacea Beauv. 160; Atlas 11. *pl. 15. f. 11.* No locality is given. See discussion under *Ampelodesma* (page 185).

Deyeuxia montana Beauv. 44, 153, 160. *pl. 9. f. 9.* *Arundo montana* Gaudin is referred to *Deyeuxia*, but the figure does not agree with the description of *Arundo montana* Gaudin. In that the awn is from near the base. Figure 9 shows a species of *Calamagrostis* with a lemma bearing an awn from near the apex. Beauvois' figure is unidentifiable. *Arundo montana* Gaudin=*Calamagrostis varia* (Schrad.) Host.

Deyeuxia sedenensis Beauv. 44, 153, 160. *pl. 9. f. 10.* "*Arundo sedenensis* Décand." is referred to *Deyeuxia*. This presumably is an error for *A. sedenensis* Loisel. The name is not found in DeCandolle's work=*Calamagrostis sedenensis* (Loisel.) Loisel., generally referred to *C. varia* (Schrad.) Host.

Gen. XLII. PANICUM L.

Panicum floridum "Retz. Wild."; Beauv. 169. Evidently an error for *P. flavidum* Retz., included in Willdenow's Species Plantarum.

Panicum glaucescens Beauv. 169. Name only, referred to *Arundinaria*. (See *Arundinaria glaucescens*. page 209.)

Panicum quale L.; Beauv. 170. Name only, referred to *Setaria viridis*.

PARACTAENUM Beauv. 47.

"Inflorescence paniculate; panicle simple; spikelets appressed to the axis and subimmersed in its cavities; glumes obtuse, the lower half as long as the upper; lower floret neuter, its lemma and palea herbaceous; upper floret perfect, the lemma and palea coriaceous-indurate, glabrous."

"Obs. . . . *Paractaenum* has an aspect quite distinct in the summit of its axis terminating in a point or sort of spine, a character of which *Dineba* alone [*Bouteloua* is meant] offers an example. * * * I suppose it is described in the interesting work of Robert Brown; but as my specimen is abortive or mutilated I can not place it satisfactorily in any of his genera."

Paractaenum novae-hollandiae, the only species, is the type. Miss Hughes[79] examined a specimen in the British Museum, sent from Paris in 1816 and named *Paractaenum novae-hollandiae* Beauv. "It was collected by Leschen-

[78] Enum. Pl. 1: 127. 1809.

[79] Kew. Bull. Misc. Inf. **1923**: 287. *f. 1–6.* 1923.

ault in 'Îles Stériles' (probably Shark's Bay) in 1802, and is possibly the plant described by Beauvois, as it is very similar to his illustration. The analyses of the spikelet agree perfectly, but the drawing is incorrect in that each spikelet really lies in a cavity between a bristle (which is broad, flat, and either acuminate or obtuse) and the flattened rhachis." The plant is a depauperate specimen of the species hitherto called *Panicum reversum* F. Muell. Miss Hughes gives an emended description and correct illustration and points out that the short branches are reversed at maturity and readily disarticulate, as in *Plagiosetum* Benth. to which it is related. Genus valid.

Paractaenum novae-hollandiae Beauv. 47. *pl. 10. f.* 6. Valid.

ANTHAENANTIA Beauv. 48.

"Inflorescence paniculate; panicle nearly simple; glumes subequal, concave, herbaceous; lower floret neuter, the lemma and palea membranaceous, opposite, placed contrariwise to the perfect floret; upper floret perfect, the lemma and palea subcartilaginous."

Phalaris villosa Michx., the only species included, is the type. Genus valid.

The figure of the spikelet shows two white lanceolate organs, like a lemma and palea, placed crosswise in front of the fertile floret. There is no such structure in the species cited, which the figures of the panicle and closed spikelet well represent. The name is derived from *ἀνθέω* flower and *ἐναντίως* contrary. Kunth [80] says that Beauvois must have split the palea of the sterile floret, and have mistaken the parts for lemma and palea of a lower floret, having mistaken the sterile lemma for the [first] glume. [The first glume is wanting]. This is undoubtedly the correct explanation. In the index the name is spelled *Anthenantia*.

Anthaenantia villosa Beauv. 48, 151. *pl. 10. f.* 7. Based on *Phalaris villosa* Michx. Valid.

HYMENACHNE Beauv. 48.

"Inflorescence paniculate; panicle simple, spikelike; branches contracted; glumes unequal, herbacous, acute, the lower much shorter; lower floret neuter, the lemma acute, the palea very short, membranaceous, hyaline; upper floret perfect, the lemma and palea herbaceous, membranaceous, acute."

"*Agrostis myuros* Lam. *monostachya* Poir." are cited. Beauvois doubtless meant *Panicum myuros* Lam., but he misunderstood that species as shown by the figure named *H. myuros*. That represents *Agrostis monostachya* Poir., which is therefore taken as the type. This is *Hymenachne amplexicaulis* (Rudge) Nees. The type specimens of both species cited by Beauvois were examined by A. S. Hitchcock in the Paris Herbarium. Genus valid.

Hymenachne myuros Beauv. 49, 165. *pl. 10. f.* 8. The name is based on *Agrostis* [error for *Panicum*] *myuros* Lam. Lamarck's species is *Sacciolepis myuros* (Lam.) Chase, but the figure is *H. amplexicaulis*.

MONACHNE Beauv. 49.

"Inflorescence paniculate; panicle compound; glumes subequal, villous, longer than the floret; lower floret staminate, the lemma membranaceous, hyaline, the palea wanting; upper floret perfect the lemma coriaceous-indurate, entire."

Monachne unilateralis Beauv. *pl. 10. f. 9*, and *Saccharum reptans* Lam., *f. 10*, are cited and figured. Figure 9, showing a repeatedly branching panicle, a

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[80] Rév. Gram. **2**: 217. 1830.

raceme, and a displayed spikelet enlarged, is not identifiable. It was probably drawn from more than one species, one of them, judging from the globular structure at the base of the spikelet, being a species of *Eriochloa*. The lemma shown in this spikelet is not awned. The first species being unidentifiable, the second, *Saccharum reptans* Lam. (*Monachne racemosum* Beauv.) is taken as the type. This is a South American species of *Panicum*, *P. reptans* (Lam.) Kunth, not L., allied to *P. urvilleanum* Kunth. Kunth's name being untenable, *P. racemosum* (Beauv.) Spreng. is the valid name. The source of Beauvois' specimen is not given=*Panicum* L.

Monachne racemosa Beauv. 168. *pl. 10, f. 10.* In the text (page 49) this figure is cited as "Saccharum reptans ? Lam." but in the Atlas it is called *Monachne recemosa=Panicum racemosum* (Beauv.) Spreng. (See above.)

Monachne unilateratis Beauv. 49. *pl. 10. f. 9.* Unidentifiable. (See above.)

GEN. XLIII. STREPTOSTACHYS Desv.

Desvaux described this genus from a specimen having abnormal elongate falcate spikelets, consisting of many sterile lemmas. A. S. Hitchcock examined Desvaux's specimens in the Paris Herbarium. One had normal spikelets, one abnormal, and one had both kinds.

Streptostachys hirsuta Beauv. 50. *pl. 10. f. 11=Panicum asperifolium* (Desv.) Hitchc. (*Panicum vaginaeflorum* Steud. is the same species.)

GEN. LIV. DIGITARIA Hall.

Digitaria filiformis Beauv. 51, 160, 169. "*Panicum filiforme* Wild." is referred to *Digitaria*. Willdenow[81] gives Linnaeus as author=*Syntherisma filiformis* (L.) Nash.

Digitaria gibbosa Beauv. 160, 169. Based on *Panicum gibbosum* R. Br.= **Syntherisma gibbosa** (R. Br.) Chase.

Digitaria glabra Beauv. 51, 169. *Panicum glabrum* Gaudin is referred to *Digitaria*. Gaudin's name is based on *Syntherisma glabra* Schrad.=*S. ischaemum* (Schreb.) Nash.

Digitaria longifolia Pers.; Beauv. 10, 160. Error for *longiflora*. Persoon gives Retzius as author of *Paspalum longiflorum=Syntherisma longiflora* (Retz.) Skeels.

Digitaria papposa Beauv. 51, 160, 170. Based on *Panicum papposum* R. Br. *Digitaria papposa* is credited to R. Br. on page 160=*Leptoloma papposa* (R. Br.) Hughes.

Digitaria propinqua Beauv. 51, 160, 170. Based on *Panicum propinquum* R. Br. *Digitaria propinqua* is credited to R. Br. on page 160=*Syntherisma longiflora* (Retz.) Skeels.

Digitaria tenuiflora Beauv. 51, 160, 171. Based on *Panicum tenuiflorum* R. Br. *Digitaria tenuiflora* is credited to R. Br. on page 160=*Syntherisma longiflora* (Retz.) Skeels.

Digitaria thunbergii Beauv. 51. Name only.

Digitaria velutina Forsk.; Beauv. 51. Name only.

SETARIA Beauv. 51.

[Not *Setaria* Ach. 1798, nor Michx. 1803.]

"Inflorescence paniculate; panicle simple, spikelike; bristles of the spikelet 2 to many, subinvolucrate; lower glume small; lower floret neuter or staminate; lemma and palea [of perfect floret] coriaceous-indurate."

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[81] Sp. Pl. 1: 343. 1797.

Fourteen species are listed, *S. viridis*, being illustrated, is taken as the type[82]=*Chaetochloa* Scribn.

Setaria erubescens Beauv. 51, 169, 178. Based on *Panicum erubescens* Willd. This species, from the island of St. Thomas, has not been identified. The brief diagnosis suggests *Pennisetum setosum* (Swartz) Rich.

Setaria geniculata Beauv. 51, 169, 178. "*Panicum geniculatum* Wild." is referred to *Setaria*. Willdenow[83] cites "Hornem. cat. hort. haf. p. 28. Habitat in Antillis." In Hornemann[84] this is a name only, with Vahl as author. The name is not found in Vahl's works. Willdenow's description applies fairly well to *Chaetochloa geniculata* (Lam.) Millsp. & Chase.

Setaria germanica Beauv. 51, 169, 178. Based on *Panicum germanicum* Willd. A form of *Chaetochloa italica* (L.) Scribn.

Setaria glauca Beauv. 51, 169, 178. Based on *Panicum glaucum* L.=*Pennisetum glaucum* (L.) R. Br.[85]

Setaria italica Beauv. 51, 170, 178. Based on "*Panicum italicum* Wild." Willdenow[86] places "W." after his description, but this must imply that the description is original, not taken from Linnaeus. Several references cited by Linnaeus are given=*Chaetochloa italica* (L.) Scribn.

Setaria muricata Beauv. 51, 170, 178. Based on *Panicum muricatum* Michx. =*Echinochloa crusgalli* (L.) Beauv. (Held distinct by some as *E. muricata* (Michx.) Fernald.)

Setaria purpurea Beauv. 51, 170, 178. Based on *Panicum purpureum* Ruiz & Pav. This Peruvian species has not been identified.

Setaria sericea Beauv. 51, 171, 178. Based on *Panicum sericeum* Ait. This species, described from plants grown from seed from the West Indies, has not been identified. The description suggests *Pennisteum setosum* (Swartz) Rich., but does not wholly agree with that.

Setaria setosa Beauv. 51, 171, 178. Based on *Panicum setosum* Swartz= *Chaetochloa setosa* (Swartz) Scribu.

Setaria verticillata Beauv. 51, 171, 178. Based on *Panicum verticillatum* L.=*Chaetochloa verticillata* (L.) Scribn.

Setaria villosa "Lin."; Beauv. 51, 171, 178. Name only.

Setaria viridis Beauv. 51, 171, 178. *pl. 13. f. 3.* Based on *Panicum viride* L.=*Chaetochloa viridis* (L.) Scribn.

Setaria umbrosa Beauv. 51, 178. Name only.

Setaria vulpina Beauv. 51, 171, 178. Based on *Panicum vulpinum* Willd.= *Pennisetum ciliare* (L.) Link.

Setaria longiseta Beauv. Fl. Owar. **2**: 81. *pl. 110.* 1818.[87] The type, collected by Beauvois in Oware, Africa, was examined in the Delessert Herbarium. This species was referred to *Pennisetum* by Schumann[88] and placed in subseries *Beckeropsis* of *Pennisetum* by Leeke,[89] but the Beauvois specimen does not belong in *Pennisetum*. It is the species represented by Stolz no.

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[82] See Hitchcock, Contr. U. S. Nat. Herb. **22**: 156, 208. 1920.

[83] Enum. Pl. 1031. 1809.

[84] Enum. Pl. Hort. Hafn. 28. 1807.

[85] See Chase, Amer. Journ. Bot. **8**: 41–49. 1921.

[86] Sp. Pl. **1**: 336. 1797.

[87] The date on the title page is 1807, but the fascides were issued at irregular intervals. (See pages 173, 213.)

[88] Engl. Pflanzenw. Ost-Afr. **C**: 105. 1895.

[89] Zeitschr. Naturw. **79**: 28. 1907.

1384 from Kyimbila, Africa, distributed by the Berlin Herbarium as *Setaria longiseta* Beauv.=**Chaetochloa longiseta** (Beauv.) Chase.

UROCHLOA Beauv. 52.

"Inflorescence spicate; spike compound, the spikelets alternate or opposite; spikelets subgeminate, subinvolucrate with few (2 or 3) hairs; lower glume very small; lower floret staminate, the lemma and palea herbaceous; upper floret perfect, the lemma and palea coriaceous-indurate, transversely wrinkled, the lemma terminating in a short bristle."

Urochloa panicoides Beauv., is the only species=*Panicum panicoides* (Beauv.) Hitchc. *Urochloa* is maintained as valid by Stapf[90] for the group containing *Panicum reptans* L. and other species in which the panicle consists of racemes borne on a main axis, the group *Fasciculata* of Hitchcock and Chase in North American Species of Panicum.[91]

Urochloa panicoides Beauv. 53. *pl. 11. f. 1.* From Isle of France communicated by Jussieu=*Panicum panicoides* (Beauv.) Hitchc. This species had been confused with *Panicum helopus* Trin., from which it is distinct.[92]

ECHINOCHLOA Beauv. 53.

"Inflorescence spicate; spike compound; racemes alternate; spikelets unilateral; glumes and sterile lemma hirsute, acute, the lowest small, its base convolute; lower floret staminate or neuter, the lemma and palea herbaceous, the lemma long-acuminate or bearing a bristle, the palea bifid-dentate; upper floret perfect, the lemma and palea coriaceous-indurate, the lemma acuminate."

Panicum crusgalli, the species figured, is taken as the type. Genus valid.

Echinochloa cruscorvi Beauv. 53, 161, 169. Based on *Panicum cruscorvi* L. Probably a form of *E. crusgalli* (L.) Beauv.

Echinochloa crusgalli Beauv. 53, 161, 169. *pl. 11, f. 2.* Based on *Panicum crusgalli* L. Valid.

Echinochloa echinata Beauv. 53, 161, 169. Based on *Panicum echinatum* Willd. This species has not been identified.[93]

Echinochloa lanceolata Beauv. 53, 161, 170. Based on *Panicum lanceolatum* Retz. The original description suggests *Oplismenus* to which Kunth transferred this name.

Echinochloa setigera Beauv. 53, 161, 171. Based on *Panicum setigerum* Retz. The description suggests *Oplismenus.*

Echinochloa stagnina Beauv. 53, 161, 171. Based on *Panicum stagninum* Retz. Valid.

OPLISMENUS Beauv. Fl. Owar. **2:** 14. *pl. 68. f. 1.* 1809.[94]

Based on a single species, *O. africanus* Beauv. The type, consisting of two good specimens, collected by Beauvois in Oware, Africa, was examined in the Delessert Herbarium. The plants agree with the plate and are not

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[90] In Prain, Fl. Trop. Afr. **9**: 586. 1920.

[91] Contr. U. S. Nat. Herb. **15**: 35. 1910.

[92] See Hitchcock, Journ. Washington Acad. Sci. **9**: 551. 1919.

[93] See Hitchcock, Contr. U. S. Nat. Herb. **22**: 153. 1920.

[94] The dates at which the fascicles of this work were issued are somewhat uncertain. The date on the title page of vol. 2 is 1807, but in the discussion of *Oplismenus* (p. 15) a paper read to the Institute on September 25, 1809, is referred to.

O. burmanni, the species represented by *Zenker & Staudt* 515, from Kamerun, Africa, the spikelet of which was figured as *O. africanus* by Chase.[95] Beauvois' specimens are allied to *O. hirtellus*. Genus valid.

Oplismenus bromoides Beauv. 54, 168, 169. Based on *Panicum bromoides* Lam.=*O. burmanni* (Retz.) Beauv.

Oplismenus burmanni Beauv. 54, 168, 169. Based on *Panicum burmanni* Retz. Valid.

Oplismenus compositus Beauv. 54, 168, 169. "*Panicum compositum* Burm." is referred to *Oplismenus*. Burmann[96] gives Linnaeus as author. Valid.

Oplismenus elatior Beauv. 54, 168, 169. Based on "*Panicum elatior* Lin." [error for *elatius*]. Probably *O. compositus*.

Oplismenus foliaceus Beauv. 54. Error for *loliaceus*, *Panicum loliaceum* Lam. being referred to *Oplismenus* (page 168).

Oplismenus helvolus Beauv. 54, 168, 170. Based on *Panicum helvolum* L. A species of *Chaetochloa*.

Oplismenus hirtellus Beauv. 54, 168, 170. Based on *Panicum hirtellum* L. Valid.

Oplismenus loliaceus Beauv. 168, 170. Based on *Panicum loliaceum* Lam.=*O. compositus* (L.) Beauv.

Oplismenus undulatifolius Beauv. 54, 168, 171. Name only. "*Panicum undulatifolius* And." [error for Ard.] is referred to *Oplismenus burmanni*, and "*Panicum undulatifolium* Lin." doubtfully to *Oplismenus*. There is no *Panicum undulatifolium* L. *Panicum undulatifolium* Ard.=*O. undulatifolius* (Ard.) Roem. & Schult.[97]

MELINIS Beauv. 54.

"Inflorescence paniculate; panicle compound; lower glume minute, entire; upper glume 3 or 4 times larger, the apex emarginate, cordate-mucronate; lower floret neuter, the lemma herbaceous, the apex sub-bilaciniate, bearing a long bristle between the lobes, the palea wanting; upper floret perfect, the lemma and palea coriaceous-indurate; lemma sub-bidentate, muticous."

Melinis minutiflora, is the only species. Genus valid.

Melinis minutiflora Beauv. 54. *pl. 11. f. 4.* A plant from Rio Janeiro was communicated by Jussieu. Valid.

ARRHENATHERUM Beauv. 55.

"Inflorescence paniculate; panicle compound, effuse; glumes membranaceous, shorter than the florets; lower floret staminate, the lemma bilaciniate at the apex, the lobes often erose-ciliate, awned from below the middle of the back, the palea membranaceous, hyaline, bifid-dentate * * *; upper floret perfect, the lemma and palea bifido-dentate, the lemma awned below the apex, the awn short, rather inconspicuous."

Avena elatior L., the first species cited and the one illustrated in the figure referred to by Beauvois, is the type. Genus valid.

Arrhenatherum americanum Beauv. 56, 152. Name only.

Arrhenatherum avenaceum Beauv. 152, 153. *pl. 11. f. 5.* A change of name for *Avena elatior*=*Arrhenatherum elatius* (L.) Mert. & Koch.

Arrhenatherum precatorium Beauv. 56, 152, 154. *pl. 1. f. 2.* Based on *Avena precatoria* Thuill.=*Arrhenatherum elatius tuberosum* (Gilib.) Halácsy.

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[95] Proc. Biol. Soc. Washington **24**: 152. 1911.

[96] Fl. Ind. 25. 1768.

[97] Syst. Veg. **2**: 482, 1817.

POGONATHERUM Beauv. 56.

"Culm branching; inflorescence spicate; spike simple; glumes villous at base, the lower muticous, the upper bearing a long bristle; lower floret neuter, the lemma and palea membranaceous, muticous; upper floret perfect, the lemma awned from the back."

Saccharum paniceum Lam., cited under the genus and the basis of *P. saccharoideum*, is the type. Genus valid.

Pogonatherum saccharoideum Beauv. 176. *pl. 11. f. 7.* Evidently a change of name for *Saccharum paniceum=P. paniceum* (Lam.) Hack.

ICHNANTHUS Beauv. 56.

"Inflorescence paniculate; panicle compound; spikelet 3-flowered; glumes unequal, the lower shorter and broader, the apex bifid-dentate, mucronate between the teeth; lowest floret neuter, the lemma muticous, the palea wanting; middle floret incomplete, abortive, the lemma and palea cartilaginous, opposite, placed contrariwise to the other florets; upper floret perfect, the lemma and palea coriaceous-indurate, muticous, entire."

The structure mistaken for an abortive middle floret is the pair of wings at the base of the fertile lemma which in *I. panicoides*, the type species, are unusually large.[88] Genus valid.

Ichnanthus panicoides Beauv. 57. *pl. 12. f. 1.* "Croit dans l'Amerique méridionale . . . communiquée par M. Desfontaines." Valid.

GEN. XLVI. CENCHRUS L.

Cenchrus gracilis Beauv. 57, 157. Name only, for a specimen communicated by Bosc.

Cenchrus orientalis Beauv. 157. Referred to *Pennisetum;* probably the Willdenow herbarium name cited by Richard[89] as a synonym of *Pennisetum orientale* L. Rich. is intended.

Cenchrus spinifer Beauv. 57. Error for *spinifex.*

GEN. XLVIII. PENICILLARIA Swartz.

Penicillaria cylindrica Beauv. 59, 172. Name only.

GEN. XLIX. PENNISETUM L. Rich.

Pennisetum amethistinum [*amethystinum*] Beauv. 59, 172. Name only.

GYMNOTHRIX Beauv. 59.

"Inflorescence spicate; spike simple; fascicles involucrate, the involucre simple, setose, the setae glabrous, unequal, one of them twice as long as the rest; spikelet one [to a fascicle]; glumes unequal, the lower truncate; lower floret neuter; upper floret perfect, the lemma and palea acute."

Gymnothrix thuarii is the only species included=*Pennisetum* L. Rich.; commonly regarded as a subgenus, including species in which the bristles are not plumose.

Gymnothrix thuarii Beauv. 60. *pl. 13. f. 6.* Communiquée par M. Dupetit-Thouars, * * * l'Isle-de-France." Probably *Pennisetum caffrum* (Bory) Leeke.

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[88] See Chase, Proc. Biol. Soc. Washington **24:** 142. *f. 10.* 1911.

[89] In Pers. Syn. Pl. **1:** 72. 1805.

GEN. L. ARUNDO L.

Arundo lanceolata Koel.; Beauv. 20. Name only, listed under *Achnatherum*. Probably *Calamagrotis lanceolata* Koel. was intended. (See page 160.)

Arundo littoralis Beauv. 144. Name only, cited under *Psamma=Ammophila arenaria* (L.) Link.

Arundo montana "Wild."; Beauv. 78, 152. Name only, cited under *Donax*.

Ehrartha Schreb. (pp. 60, 161) is a misspelling of *Ehrharta*.

GEN. LII. TROCHERA L. Rich.

Trochera bulbosa Beauv. 62, 161, 181. *pl. 12. f. 3.* Based on *Ehrharta bulbosa* Smith. Valid in *Ehrharta*.

Trochera calicina Beauv. 62, 161, 181. *pl. 12. f. 4.* Based on *Ehrharta calycina* Smith. Valid in *Ehrharta*.

GEN. LIII. HIEROCHLOA Gmel.

Hierochloa odorata Beauv. 62, 164. *pl. 12. f. 5.* Based on *Holcus odoratus* L.=*Torresia odorata* (L.) Hitchc.

Hierochloa repens Beauv. 62, 164. *Holcus repens* Pers. is cited (page 62) and the same name without author is referred (page 165) to *Hierochloa*. The name does not appear in Persoon's work. Presumably meant for *Holcus repens* Host, which is *Torresia odorata* (L.) Hitchc.

GEN. LV. "TORESIA Fl. Peruv." [Error for *Torresia* Ruiz & Pav.]

Tor[r]esia antar[c]tica Beauv. 63, 179. *pl. 12. f. 7.* Based on *Disarrhenum antarcticum* Labill. Labillardiere's description and plate[100] show this to be the same as *Torresia redolens* (Forst.) Roem. & Schult.

Tor[r]esia magellanica Beauv. 179. Name only. "*Aira magellanica* Lam." is cited under *Torresia* (page 63) but this name is not found in Lamarck's work, nor in any work previous to Beauvois.

Aira magellanica Lam.; Beauv. 63. Name only, cited under *Toresia* [*Torresia*].

GEN. LXI. CAMPULOSUS Desv.

Campulosus falcatus Beauv. 64, 157, 158. Based on *Chloris falcata* Swartz, this based on *Melica falx L. f.*, which is the type of the genus *Harpochloa* Kunth,[101] the specific name being changed to *H. capensis=Harpochloa falx* (L. f.) Kuntze.

Campulosus monostachyos Beauv. 64, 157, 158. *pl. 13. f. 1.* Based on *Chloris monostachya* Michx.=*C. aromaticus* (Walt.) Trin.

GEN. LVIII. CYNOSURUS L.

Cynosurus caerulescens L.; Beauv. 159. Error for *C. coeruleus=Sesleria coerulea* (L.) Ard.

Cynosurus domingensis Pers.; Beauv. 159. Evidently meant for *Eleusine domingensis* Pers., which is based on *Cynosurus domingensis* Jacq. Referred to *Rabdochloa=Leptochloa domingensis* (Jacq.) Trin.

Cynosurus durus Hoffm.; Beauv. 159. Referred to *Sclerochloa;* under *Sclerochloa* (page 98) *Poa dura* L. is cited. "Hoffm." is evidently an error

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[100] Nov. Holl. Pl. **2**: 83. *pl. 232.* 1806. [101] Rév. Gram. **1**: 92. 1829.

for L., and *Poa dura* an error for *Cynosurus dura* L.=*Sclerochloa dura* (L.) Beauv.

Cynosurus effusus "Lin." ; Beauv. 159. (Probably an error for Link.) Referred to *Chrysurus*. *Cynosurus effusus* Link is commonly referred to *Cynosurus elegans* Desf.

Cynosurus flocciformis Forsk.; Beauv. 159. Error for *C. floccifolius* Forsk.= *Eleusine floccifolia* (Forsk.) Spreng.

Cynosurus glaber Beauv. 159. Name only, referred to *Dactyloctenium*.

Cynosurus pilosus Beauv. 159. Name only, referred to *Dactyloctenium*.

Cynosurus retroflexus L.; Beauv. 98, 159. (L. is probably an error for Vahl.) Referred to *Dineba*=*Dinebra retroflexa* (Vahl) Panz.

Cynosurus uniola Thunb.; Beauv. 159. Thunberg[102] does not cite the author, but it is doubtless Linnaeus' species which he describes=*Brizopyrum uniolae* (L. f.) Schrad.=**Desmazeria uniolae** (L. f.) Chase.

The name *Brizopyrum* is not tenable, that genus being based by Link[103] on *Poa sicula* Jacq., which is also the type species of *De*[*s*]*mazeria* Dum.[104] published earlier. Stapf[105] uses the name "*Brizopyrum* Nees (in part, not of other authors)" for the South African species included by Nees in *Brizopyrum* Link. Bentham and Hooker[106] and Hackel[107] include the South African species in *Desmazeria* Dum. with *D. sicula*, with which to us they seem to be congeneric.

ELYTROPHORUS Beauv. 67.

"Inflorescence spicate; spike compound; fascicles sessile, globose-contracted, the lowermost rather remote; partial involucre of 3 to 7 lanceolate bracts; glumes acute, subulate, 3 to 6-flowered, nearly as long as the florets; lemma and palea unequal, the lemma keeled, ventricose, subulate, the palea 2-cleft, emarginate, short-mucronate between the denticulate lobes."

Elytrophorus articulatus is the only species. Genus valid.

Elytrophorus articulatus Beauv. 67. *pl. 14. f. 2.* No locality is given, but "Gramen alopecuroides, Maderaspastanum etc. Pluck. Alm. tab. cxc, fig. xvi [vi]" is cited. Plukenet's name indicates that his plant was from India. Valid.

Briza multiflora Forsk. (page 155) is referred to *Megastachya*. Doubtless a mistake for *Poa multiflora* Forsk.

GEN. LX. MELICA L.

Melica aquatica Web.; Beauv. 167. Name only, referred to *Poa aquatica* L. "Web." is evidently an error for Wibel; *Melica aquatica* is not found in his work, but "*M*[*olinia*] *aquatica*" Wib., based on *Aira aquatica* L., is on the page[108] with Melica, and doubtless was what caught Beauvois' eye. *Aira aquatica* L. is the basis of *Catabrosa aquatica* (L.) Beauv. *Poa aquatica* L. is the basis of *Panicularia aquatica* (L.) Kuntze.

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[102] Prodr. Pl. Cap. 23. 1794.
[103] Hort. Berol. 1: 159. 1827.
[104] Comm. Bot. 26. 1822.
[105] Thiselt. Dyer, Fl. Cap. 7: 701. 1898.
[106] Gen. Pl. 3: 1194. 1883.
[107] In Engl. & Prantl, Pflanzenfam. 2^2: 72. 1887.
[108] Prim. Fl. Werthem. 116. 1799.

Melica curtipendula "Mich."; Beauv. 98. Name only, evidently error for *Chloris curtipendula* Michx.

GEN. LXIII. **ORTHOCLADA** Beauv. 69.

"Inflorescence paniculate; panicle compound, the branches numerous, subverticillate, very long, straight, rigid, spikelet-bearing only at the ends; glumes 3 or 4-flowered, shorter than the florets."

Orthoclada rariflora, the species illustrated, is the type. This is the same as *O. laxa*. Genus valid.

Orthoclada laxa Beauv. 70, 149, 168. Based on *Aira laxa* Rich. Valid.

Orthoclada rariflora Beauv. 70. *pl. 14. f. 9.* Based on *Panicum rariflorum* Lam. [In the Atlas the name is erroneously given as "*rarifolia*"]=*O. laxa* (Rich.) Beauv.

GEN. LXIV. POA L.

Poa aegyptia Beauv. 173. Name only.

Poa airoides Desmaz.; Beauv. 173. Referred to *Catabrosa aquatica*. Desmazieres[109] gives no authority for this name but he cites *Aira aquatica* L. *Poa airoides* Koel.[110] is based on *Aira aquatica* L.=*Catabrosa aquatica* (L.) Beauv.

Poa altissima Hall.; Beauv. 173. Referred to *Poa aquatica*. Haller[111] does not use binomials. One of his species bears a phrase name beginning "Poa altissima, foliis latissimis." A Scheuchzer phrase name is cited that Linnaeus[112] cites under *Poa aquatica*. That is *Panicularia aquatica* (L.) Kuntze.

Poa aristata "Leer."; Beauv. 174. Name only, referred to *Koeleria gracilis*. This name is not found in Leers' work. Probably *Poa cristata* L. given by Leers[113] (which is *Koeleria cristata* (L.) Pers.) was intended.

Poa caerulescens Michx.; Beauv. 77. Name only, referred to "*Tricuspis carolin.*" (See *T. caroliniana* page 184.) *Poa sesleriioides* Michx. (*Triodia flava* (L.) Hitchc.) may have been meant.

Poa curvata Beauv. 99, 174. Name only, referred to *Schenodorus* [*Schedonorus*].

Poa dura L.; Beauv. 98, 174. Referred to *Sclerochloa*. Evidently an error for *Cynosurus durus* L. (See page 176.)

Poa gracilescens Beauv. 174. Name only.

Poa minuta Beauv. 175. Name only.

Poa oblonga Moen.; Beauv. 175. Name only, referred to *Megastachya*.

Poa obtusata Beauv. 175. Name only.

Poa palustris Hoffm.; Beauv. 175. Name only, referred to *Poa trivialis* L.

Poa polymorpha Willd.; Beauv. 175. Referred to *Poa palustris*. Willdenow[114] cites *Poa polymorpha* Wib. as a synonym of *P. serotina* [Ehrh.] Schrad. (which is *Poa palustris* L.), but Ascherson and Graebner[115] refer Wibel's species to *P. nemoralis* var. *rigidula* Mert. & Koch.

Poa pratensis Roth; Beauv. 175. Name only, referred to *Poa trivialis*.

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[109] Agrost. Départ. Nord France 85. 1812.
[110] Descr. Gram. 194. 1802.
[111] Nom. Hist. Pl. Helv. 133. 1769.
[112] Sp. Pl. 67. 1753.
[113] Fl. Herborn. 31. 1775.
[114] Enum. Pl. 1: 105. 1809.
[115] Syn. Mitteleur. Fl. 2: 411. 1900.

Poa salina Roth; Beauv. 175. Name only, referred to *Poa distans*. Roth cites Pollich as author. *P. salina* Poll. is a species of *Puccinellia*.

Poa squamosa Beauv. 176. Name only.

Poa stricta "Thunb., Wild.;" Beauv. 176. Name only, probably an error for *Poa striata* Thunb. given in Willd.[116] That is referred by Stapf[117] to *Eragrostis bergiana* Trin.

Poa sylvatica Hoffm.; Beauv. 176. Name only, referred to *Poa trinervata*.

Poa tremula "Lin."; Beauv. 176. Evidently an error for Lam., Lamarck's species is the basis of *Eragrostis lamarckii* Steud. (not *E. tremula* Hochst.).

ERAGROSTIS Beauv. [Host.] 70.

The genus was published by Host[118] with the description of one species, based on *Briza eragrostis* L., but with no generic diagnosis. Beauvois gives a diagnosis and proposes the name as his own. He cites *Poa eragrostis* L. and figures the species as *Eragrostis eragrostis*. It seems probable that Beauvois did not know of Host's publication of the same generic name. It must have been suggested to both authors by the Linnaean specific names *Briza eragrostis* (*Eragrostis cilianensis* (All.) Link), and *Poa eragrostis* (*E. eragrostis* (L.) Beauv.).

Eragrostis cynosuroides Beauv. 71, 162, 174. Based on *Poa cynosuroides* Retz. Valid.

Eragrostis cyperoides Beauv. 71, 162, 174. Based on *Poa cyperoides* Thunb. Valid.

Eragrostis eragrostis Beauv. 71, 174. *pl. 14. f. 11.* Based on *Poa eragrostis* L. Valid.

Eragrostis ferruginea Beauv. 71, 162, 174. Based on *Poa ferruginea* Thunb. Valid.

Eragrostis interrupta Beauv. 71, 162, 175. Based on *Poa interrupta* R. Br. There has been much confusion in regard to this name. Bentham[119] reduces *Poa interrupta* R. Br. to *Eragrostis brownii* var. *interrupta* Benth. Judging form the description, Brown's plant, from the coast of Australia, is the perennial species represented by specimens collected by E. N. Parker, Moreton Bay, Queensland, July, 1918, distributed as *Eragrostis brownii* var. *interrupta*. There is an earlier *Poa interrupta* Lam.[120] collected by "Sonnerat", presumably in the East Indies. The very meager description gives little clue to the identity, except for "glumis minutissimis." That suggests the annual plant of Asia and the Philippines, represented by specimens distributed by the Philippine Bureau of Science as *Eragrostis interrupta* (Lam.) Doell (nos. 468, 6634, 7791, 7810, 7920); by *Levine* 3364, Kwong Tung Province, China; and by G. King, Central India, under the name *Poa diarrhena*. Stapf[121] describes this annual species as "*E. interrupta* Beauv. Agrost. 71 (non Roem. & Sch., nec Trin.)." As stated above, *E. interrupta* Beauv. is based on *Poa interrupta* R. Br. (since there is no description there can be no question of misapplication of the name). Roemer and Schultes[122] cite "*E. interrupta* P. de Beauv. * * * *Poa interrupta* R. Brown." Trinius[123] cites

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[116] Sp. Pl. 1: 398. 1797.
[117] Thiselt. Dyer, Fl. Cap. 7: 625. 1898.
[118] Icon. Gram. Austr. 4: 14. *pl. 24*. 1809.
[119] Fl. Austral. 7: 647. 1878.
[120] Tabl. Encycl. 1: 185. 1791.
[121] Hook. f. Fl. Brit. Ind. 7: 316. 1896.
[122] Syst. Veg. 2: 577. 1817.
[123] Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 1: 399. 1830.

"*Eragrostis interrupta* Pal. [Beauv.] * * * *Poa interrupta* Br." Neither of them cites *Poa interrupta* Lam. *Eragrostis interrupta* is sometimes credited to Steudel [124] who also bases the name on *P. interrupta* R. Br. In the synonymy Stapf cites *Poa interrupta* Lam. but not *P. interrupta* R. Br. Under *Eragrostis elongata* (Willd.) Jacq. Stapf (page 319) cites as synonyms "*E. interrupta* Steud. (non Beauv.) * * * *Poa interrupta & polymorpha*, Br. Prod. 180." As shown above, *Poa interrupta* R. Br. is the basis of *E. interrupta* Beauv., Roem. & Schult., Trin, and Steud. *Poa interrupta* R. Br. is invalidated by the Lamarck name, hence is not valid in *Eragrostis*. *Eragrostis interrupta* (Lam.) Doell [125] is invalidated by *E. interrupta* (R. Br.) Beauv. What the valid names for these very different species are we are not prepared to say without study of the many types involved. For the present, in the United States National Herbarium, Brown's species is placed as a form under *E. brownii* (Kunth) Nees, based on *Poa polymorpha* R. Br., and Lamarck's under *E. japonica* (Thunb.) Trin.

Eragrostis pilosa Beauv. 71, 162, 175. Based on *Poa pilosa* L. Valid.

Eragrostis poaeoides Beauv. 162. Name only, probably meant for change of name of *Poa eragrostis*, given as *Eragrostis eragrostis* in the Atlas.

Eragrostis riparia Beauv. 71, 162, 175. *Poa riparia*, without author, is referred to *Eragrostis*. *Poa riparia* Willd.[126] (the only species of the name), described from the West Indies, is, from the description, a species of *Eragrostis*, probably *E. ciliaris* (L.) Link. *Eragrostis riparia* Nees is based on "*Megastachya riparia* Willd." [Roem. & Schult.], which is based on *Poa riparia* Willd.

Eragrostis verticillata Beauv. 71, 162, 176. "*Poa verticillata* Willd." is referred to *Eragrostis*. Willdenow [127] credits the name to Cavanilles. Cavanilles's illustration (plate 93) shows this to be a species of *Eragrostis*, apparently a large form of *E. pilosa* (L.) Beauv.

LEPTOCHLOA Beauv. 71.

"Inflorescence paniculate; panicle simple, the branches or racemes alternate, simple; spikelets subsecund; glumes 3 to 5-flowered, lanceolate, acute, nearly the length of the florets; lemma keeled, acute; palea bifid-dentate."

Leptochloa virgata, the species figured, is taken as the type. Genus valid.

Leptochloa capillacea L.; Beauv. 71, 166. Name only.

Leptochloa filiformis Beauv. 71, 161, 166. Based on *Eleusine filiformis* Pers., which is evidently based on *Festuca filiformis* Lam., though that author is not cited. Valid.

Leptochloa virgata Beauv. 71, 161, 166. *pl. 15. f. 1.* Based on *Eleusine virgata* Pers., which is based on *Cynosurus virgatus* L. Valid.

GEN. LXVII. DACTYLOCTENIUM Willd.

Dactyloctenium glabrum Beauv. 72, 160. Name only.

Dactyloctenium pilosum Willd.; Beauv. 72, 160. Name only.

Dactyloctenium radulans Beauv. 72, 160. Based on *Eleusine radulans* R. Br. Bentham [128] identifies this with *Dactyloctenium aegyptium* (L.) Richt.

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[124] Syn. Pl. Glum. 1: 279. 1854.

[125] Mart. Fl. Bras. 2[3]: 157. 1878.

[126] Ges. Naturf. Freund. Berlin Neue Schrift. 4: 185. 1803.

[127] Sp. Pl. 1: 393. 1797.

[128] Fl. Austral. 7: 615. 1878.

ACHNERIA Beauv. 72.

"Inflorescence paniculate; panicle compound; glumes subequal, 2-flowered; lemma and palea lanuginose-villous."

Four species of *Eriachne* R. Br. are cited, two of them being queried in the text. None are figured. Beauvois explains that having established the principle that awned and muticous species should not be included in a single genus, it was necessary to segregate the two groups included in *Eriachne* R. Br. He suggests that perhaps all the species of *Eriachne* may belong in known genera, such as *Poa*, *Aira*, or *Festuca*, but not knowing any of the species it was impossible for him to decide, for which reason he proposes a generic division between species muticous and species awned. For the muticous species he makes an anagram of *Eriachne*. The two species queried by Beauvois are described as having mucronate lemmas. *E. obtusa*, not queried, having obtuse lemmas, is taken as the type=*Eriachne* R. Br. See discussion of *Achneria*, page 205.

Achneria brevifolia Beauv. 73, 146. Based on *Eriachne brevifolia* R. Br. Referred by Bentham [129] to *Eriachne mucronata* R. Br.

Achneria capillaris Beauv. 73, 146. Based on *Eriachne capillaris* R. Br. Valid in *Eriachne*.

Achneria mucronata Beauv. 73, 146. Based on *Eriachne mucronata* R. Br. Valid in *Eriachne*.

Achneria obtusa Beauv. 73, 146. Based on *Eriachne obtusa* R. Br. Valid in *Eriachne*.

SCHISMUS Beauv. 73.

"Inflorescence paniculate; panicle simple, contracted, spikelike; glumes 3 to 6-flowered, the length of the florets or longer; lemma cordate-emarginate, the nerve produced between the lobes into a filiform mucro; palea entire."

Schismus marginatus, the species illustrated, is taken as the type. Genus valid.

Schismus fasciculatus Beauv. 74, 177. Name only, "plante communiquée par M. Persoon et M. Balbis." Later published with a few words of description by Trinius [130] who gives *Festuca calycina* L. as a synonym=*Schismus barbatus* (L.) Chase. (See page 182.)

Schismus marginatus Beauv. 177. *pl. 15. f. 4.* The source of the specimen is not given. Nees [131] describes *S. marginatus* from South Africa, and gives *Festuca calycina* L. as a synonym. Stapf [132] considers *S. fasciculatus*, *S. marginatus*, *Festuca calycina*, and *F. barbata* L. to be the same species, using the name *Schismus fasciculatus* Beauv. *Festuca calycina* was first published by Loefling [133] in 1758. Previously, however, Linnaeus [134] described the species as *Festuca barbata* (the description given in a footnote) based on "Loefl. Habitat in Hispania." It would seem that when Loefling himself renamed his plant *F. calycina*, Linnaeus accepted the change,[135] dropping *F. barbata*, which does not again appear in his works, though he cites "Amoen. acad. 3. p. 400," and copies the diagnosis of *F. barbata* in the second edition of the Species Plantarum. The nomenclature of this species

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[129] Fl. Austral. 7: 632. 1878.
[130] Fund. Agrost. 148. 1820.
[131] Linnaea 7: 323. 1832; Fl. Afr. Austr. 421. 1821.
[132] Thiselt. Dyer, Fl. Cap. 7: 693. 1898.
[133] Iter. Hisp. 116. 1758.
[134] Amoen. Acad. 3: 400. 1756.
[135] Syst. Nat. ed. 10. 877. 1759; Sp. Pl. ed. 2. 1: 110. 1762.

is discussed at length by Billot,[136] who transfers *F. calycina* instead of *F. barbata* to *Schismus*, because Linnaeus had abandoned *F. barbata*=**Schismus barbatus** (L.) Chase.

MEGASTACHYA Beauv. 74.

[Spelled *Magastachya* in the generic heading, but *Megastachya* in the index]. "Inflorescence paniculate; panicle compound; spikelets elongate, the florets distichous, imbricate; glumes 5 to 20-flowered, shorter than the florets; lemma emarginate, mucronate between the lobes; palea bifid-dentate."

Megastachya owariensis, the only species illustrated, is taken as the type. This name appears in the Atlas only. The figure shows mucronate lemmas. It is undoubtedly the same as "*Poa mucronata* fl. Ow." cited in the text (page 74) and in the index referred to *Megastachya*. This is *Centotheca mucronata* (Poir.) Kuntze. *Megastachya* Beauv. is, therefore, a synonym of *Centotheca*, though it has usually been referred to *Eragrostis*, to which belong most of the species placed by Beauvois in *Megastachya*.

Megastachya amabilis Beauv. 74, 167, 173. Based on *Poa amabilis* "Fl. Zeyl." [of Linnaeus]=*Eragrostis amabilis* (L.) Wight & Arn.

Megastachya badensis Beauv. 74, 167, 174. Based on "*Poa badensis* Wild." This species was published by Willdenow[137] with Haenke as author=*Poa alpina badensis* (Haenke) Mert. & Koch.

Megastachya bipennata Beauv. 74, 155, 167. "*Briza bipennata* ? Lam." is cited under *Megastachya*. "*Briza bipennata* Lin., Lam." is referred to *Eragrostis* (page 155). Lamarck[138] gives Linnaeus as author. (The correct spelling is *bipinnata.*)=*Eragrostis bipinnata* (L.) K. Schum.

Megastachya brizoides Beauv. 167. Probably meant for change of name of *Briza eragrostis* L., which is cited under *Megastachya* (page 74) and referred to that genus in the index.

Megastachya ciliaris Beauv. 74, 167, 174. Based on *Poa ciliaris* L.=*Eragrostis ciliaris* (L.) Link.

Megastachya elongata Beauv. 74, 167, 174. *Poa elongata* without author is referred to *Megastachya*. Probably *P. elongata* Willd. was intended=*Eragrostis elongata* (Willd.) Jacq.

Megastachya hypnoides Beauv. 74, 167, 175. Based on *Poa hypnoides* Lam. Michaux is given as authority on page 74 but on page 175 the name is correctly credited to Lamarck=*Eragrostis hypnoides* (Lam.) B. S. P.

Megastachya mucronata Beauv. 74, 167. Based on "*Poa mucronata* Fl. Ow."=*Centotheca mucronata* (Poir.) Kuntze. See *Megastachya owariensis* below. Poiret[139] published *Poa mucronata* for a plant from Africa which he saw in Jussieu's herbarium. It seems probable that it was Beauvois' collection from Africa which he saw. The description applies well to the species represented by *Jeffreys* 32, Opoba, South Nigeria, and *Ledermann* 921, Kamerun. The title page date of Flore Oware volume 1 is "1804–07" but the first fascicle did not appear until 1805. Kuntze[140] and Hackel[141] transferred

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[136] Annot. Flore France et d'Allemagne 285. 1861. (The article is unsigned, hence it is assumed that it is the work of the editor, Billot.)

[137] Sp. Pl. **1**: 392. 1797.

[138] Encycl. **1**: 465. 1783.

[139] Lam. Encyc. **5**: 91. 1804.

[140] Rev. Gen. Pl. 765. 1891. The exact date is uncertain. This part was reviewed in November, 1891, issue of Naturae Novitates. It seems probable that Kuntze's work appeared earlier than Hackel's.

[141] Journ. Linn. Soc. Bot. **29**: 66. 1891 (Aug. 22).

Poa mucronata to *Centotheca* the same year. *Eragrostis beninensis* Steud. and *E. owariensis* Steud. are based on *Poa mucronata* Beauv. and *Megastachya owariensis* Beauv., respectively.

Megastachya multiflora Beauv. 74, 167. Beauvois refers "*Briza multiflora* Forsk." to *Megastachya*, but Forskäl did not publish that name. Doubtless *Poa multiflora* Forsk. was intended. That is *Eragrostis multiflora* (Forsk.) Schweinf. & Aschers. 1867 (not Trin. 1830). Probably *E. cilianensis* (All.) Link.

Megastachya oblonga Beauv. 74, 167, 175. Based on "*Poa oblonga* Moench," evidently an error for *Briza oblonga* Moench. Based on a garden plant.

Megastachya owariensis Beauv. Atlas 11. *pl. 15. f. 5.* This is given in the Atlas only. "*Poa mucronata* Fl. Ow." is referred (p. 175) to *Megastachya*. In the Flore d'Oware [142] Beauvois describes the species from his own collection, without reference to Poiret's description of it under the same name the year before. (See *M. mucronata* above.)=*Centotheca mucronata* (Poir.) Kuntze.

Megastachya polymorpha Beauv. 74, 167, 175. Based on *Poa polymorpha* R. Br.=*Eragrostis brownii* (Kunth) Nees.

Megastachya reptans Beauv. 74, 167, 175. Based on *Poa reptans*, no author given, presumably Michx.=*Eragrostis hypnoides* (Lam.) B. S. P.

Megastachya rigida Beauv. 74. 167, 175. Based on *Poa rigida* L.=*Scleropoa rigida* (L.) Griseb.

Gen. LXVII. UNIOLA L.

Uniola ciliata Beauv. 75. Name only.

Uniola intermedia Bosc mss.; Beauv. 75, 181. Name only.

Uniola pungens Beauv. 75, 181. Name only.

Uniola latifolia "Lin."; Beauv. 181. Error for *U. latifolia* Michx.

Uniola maritima "Lin."; Beauv. 181. Error for *U. maritima* Michx. which is *Uniola paniculata* L.

CERATOCHLOA Beauv. 75.

"Inflorescence paniculate; panicle subsimple; spikelets compressed, the florets distichous-imbricate; glumes 12 to 18-flowered, shorter than the florets; lemma and palea bifid-dentate, the lemma mucronate between the teeth."

Festuca unioloides [Willd.], the only species cited under the genus, and the one illustrated, is the type=*Bromus* L., commonly maintained as a section for the species having strongly flattened spikelets.

Ceratochloa festucoides Beauv. 158. Name only.

Ceratochloa unioloides Beauv. 75. Atlas 11. *pl. 15. f. 7.* *Festuca unioloides* without author is cited under the genus. Willdenow's species is the only one of that name. This was described from a garden specimen, the habitat doubtfully given as "Carolina." The plate shows the awnless cultivated rescue grass (*Bromus willdenowii* Kunth based on *Festuca unioloides* Willd.), which is an ally of *Bromus unioloides* H. B. K., described from Ecuador, with out reference to Willdenow's species.

Gen. LXX. TRIODIA R. Br.

Triodia decumbens Beauv. 76, 160, 179. *pl. 15. f. 9.* Based on *Danthonia decumbens* DC., which is based on *Festuca decumbens* L.=*Sieglingia decumbens* (L.) Bernh.

Triodia glumosa Beauv. Atlas 12. *pl. 18. f. 7.* This is evidently an error for *Danthonia glumosa*. That name and the figure are cited under *Danthonia*

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[142] Beauv. Fl. Owar. 5. *pl. 4.* 1805.

(page 92), and the figure, which represents a species of *Danthonia*, is not cited under *Triodia*. (See *Danthonia glumosa* (Michx.) Beauv., page 191.)

TRICUSPIS Beauv. 77.

"Inflorescence paniculate; panicle subsimple; glumes keeled, 5 to 7-flowered, shorter than the florets; lemma bifid-dentate, mucronate between the teeth and on both sides; palea truncate, nearly emarginate."

Tricuspis caroliniana Beauv., the species illustrated, is the type=*Triodia* R. Br.

Tricuspis caroliniana Beauv. 179. *pl. 3. f. 29; pl. 15. f. 10.* "Communiquée par M. Bosc" (probably from South Carolina). The figures represent *Triodia flava* (L.) Hitchc., though that of the lemma is inaccurate in that it is represented as hairy across the back instead of on the nerves only.

Tricuspis novae-boracensis Beauv. 77, 179. "l'Etat de New-Yorck, d'ou M. Delille l'a rapportée." Name only.

DONAX Beauv. 77.

"Inflorescence paniculate; panicle compound; glumes membranaceous, 5 to 7-flowered; lemma with 3 bristles, the middle one longer; palea truncate, emarginate or bifid-dentate."

Donax arundinacea (based on *Arundo donax* L., the origin of the generic name) is the type=*Arundo* L.

There are three illustrations. Beauvois observes (page 78) that *Donax* might easily be divided into two or three genera, on the differences in the lemma, the lodicules, and the ovary, but he does not wish to add to the number of new genera. The three illustrations are explained: I. *Pl. 15, f. 11*, is named *Deyeuxia arundinacea* in the Atlas (see *Ampelodesma*, page 185.) II. *Pl. 16, f. 4* (named *Donax arundinaceus* and representing *Arundo donax*) and *f. 5* (named *D. thuarii*, see below) are true *Donax*. III. *Pl. 19, f. 1* (also named *Donax arundinaceus* in the Atlas, though no name is mentioned in the observation), represents a very different grass. The spikelet and floret appear to have been drawn from a specimen of *Fluminea festucacea* (Willd.) Hitchc., but the panicle was either drawn from another grass or was greatly idealized. Possibly "*arundinaceus*" in the name of this figure may be an error for "*festucacea*." (See below.)

Donax acutiflorus Schleich.; Beauv. 161. Name only, "*Arundo acutiflora* Schleich." being referred (page 152) to *Donax montana*, and *A. acutiflora* Willd. to *Deyeuxia*. Schleicher[143] lists *Arundo acutiflora* Schrad. That is a species of *Calamagrostis*.

Donax arundinaceus Beauv. 78, 152, 161. *pl. 16. f. 4.* (This name is given also to plate 19, figure 1, see above, but that is obviously an error.) Based on *Arundo donax* L. Valid in *Arundo*.

Donax benghalensis Beauv. 78, 152, 161. Based on *Arundo benghalensis* [*bengalensis*] Retz. Referred by Hooker[144] to *Arundo donax* L.

Donax bicolor Beauv. 78, 152, 161. Based on *Arundo bicolor* Desf. This species, illustrated by Desfontaines,[145] was described earlier by Poiret[146]= *Ampelodesmos bicolor* (Poir.) Kunth.

Donax festucacea Beauv. 78, 152, 161. Based on *Arundo festucacea* Willd. The genus *Scolochloa* Link (1827, not Mert. & Koch, 1823) is based on this species=*Fluminea festucacea* (Willd.) Hitchc. *Donax* is masculine, but Beauvois uses both masculine and feminine endings.

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[143] Cat. Pl. Helv. 7. 1807.
[144] Fl. Brit. Ind. 7: 303. 1896.
[145] Fl. Atlant. 1: *pl. 33.* 1798.
[146] Voy. Barb. 2: 104. 1789.

Donax festucoides Beauv. 78, 161. Based on *Arundo festucoides* Desf. which is the basis of *Ampelodesmos festucoides* (Desf.) Steud. Generally referred to *Ampelodesmos tenax* (Vahl) Link, which is *A. mauritanicus* (Poir.) Dur. & Schinz.

Donax mauritanica Beauv. 78, 152, 161. Based on *Arundo mauritanica* Poir.=*Ampelodesmos mauritanicus* (Poir.) Dur. & Schinz.

Donax montana Beauv. 52, 161. Name only. "*Arundo montana* Wild." (name only) is cited under *Donax* (page 78) and referred to it in the index.

Donax tenax Beauv. 78, 153, 161. Based on *Arundo tenax* Vahl. This species is the type of *Ampelodesmos* Link. (See *Ampelodesma* below)=*A. mauritanicus* (Poir.) Dur. & Schinz.

Donax th[o]uarii Beauv. 78, 161. *pl. 16. f. 5.* No locality is given. Kunth,[147] who changes the name to *Arundo madagascariensis*, states that he received a specimen of this from Petit-Thouars who collected it in Madagascar=*Arundo thouarii* (Beauv.) Dur. & Schinz.

Donax versicolor Beauv. 78, 153, 161. *Arundo versicolor*, without author, is referred to *Donax.* Beauvois probably meant *Arundo versicolor* Mill., cited by Lamarck [148] under *A. donax* L.

Ampelodesma Beauv. 78. *pl. 15. f. 11.* This name is mentioned under Donax, in explanation of the figure cited. "Lemma bifid-dentate * * * It might be called *Ampelodesma.*" (This name is not in the index.) In the Atlas (page 11) plate 15, figure 11 is called *Deyeuxia arundinacea*, and that name is listed in the index. The spikelet shown consists of unequal glumes, a lower floret with the lemma hairy on the back, and with a short awn from between two small lobes of the apex, and an additional structure like an empty, glabrous lemma, not toothed or awned. This figure has been generally identified as *Ampelodesmos tenax* (Vahl) Link. It may have been drawn from a depauperate specimen of that in which only the lowest floret is well developed. The generic name is credited to Beauvois by Bentham and Hooker, Hackel, and others, but Beauvois observes only that if *Donax* were to be divided into two or three genera this might be called *Ampelodesma*, adding that he is not willing to increase the number of new genera. No specific name is cited in his note and the name given to the figure, *Deyeuxia arundinacea*, is obviously an error. Link [149] published *Ampelodesmos* with one species, *A. tenax*, based on *Arundo tenax* Vahl. Link cites "*Donax tenax* Beauv. R. S. 2.601" as a synonym. The citation of Roemer and Schultes seems to indicate that Link did not have Beauvois' book. (They do not cite *Ampelodesma* on page 601, but give it (page 34) as a section of *Donax.*) Link cites *Arundo ampelodesmos* Cyrillo [150] as synonym of *A. tenax.* That and not Beauvois' suggestion must have been the source of the generic name. The genus *Ampelodesmos* should be credited to Link and take date from 1827. Link and Vahl [151] both cite *Arundo mauritanica* Poir.[152] as a synonym of *A. tenax*=*Ampelodesmos mauritanicus* (Poir.) Dur. & Schinz.

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[147] Rév. Gram. **2**: 273. *pl. 148.* 1830.

[148] Encycl. **6**: 268. 1804.

[149] Hort. Berol. **1**: 136. 1827.

[150] Cyrillo, Pl. Rar. Neap. **2**: 30. *pl. 12.* 1792. The specific name is spelled *ampelodesmon.* The illustration is unmistakable.

[151] Symb. Bot. **2**: 25. 1791.

[152] Voy. Barb. **2**: 105. 1789.

Sesleria microcephala "Hoffm., Pers." Beauv. 78. Persoon [153] cites "Hoffm." as author of the name under *Cynosurus*. Referred by Ascherson and Graebner [154] to *Sesleria ovata* (Hoppe) Kern.

GEN. LXXII. CHLORIS Swartz.

Chloris emarginata Beauv. 79, 158. Name only.

Chloris radicata Beauv. 158. Error for *C. radiata* Swartz.

Chloris scariosa Beauv. 79, 158. Name only.

Chloris tetrapogon Beauv. 158, 179. *Tetrapogon* Desf. is referred to *Chloris; T. villosus* Desf., the only species included by Desfontaines, must be the basis of *C. tetrapogon*. Valid in *Tetrapogon*.

Chloris verrucosa Beauv. 158. Probably an error for *C. ventricosa* R. Br.

STREPTOGYNA Beauv. 80.

"Inflorescence spicate; spike compound; spikelets not crowded, sessile, 3 to 5-flowered; glumes unequal, the lower one-third as long as the upper; lemma and palea convolute, emarginate and bearing a bristle; * * * stigmas rough, retrorsely barbed, twisted in drying."

Streptogyna crinita, is the only species. Genus valid. Beauvois spells the name *Streptogyna*, giving Streptogyne as the French name.

Streptogyna crinita Beauv. 80. *pl. 16. f. 8.* Beauvois states that he brought back this plant from the United States, Carolina; that he also saw specimens in the Paris Museum and in the herbarium of Richard, but from Guyane [Guiana]. The notes on Beauvois' collections must have become mixed. This grass is from the tropics; his specimen probably came from the West Indies. Beauvois spent a few years in Santo Domingo. (See page 211.)

Streptogyna guyanensis Beauv. 179. "De la Guyane." Said to differ from *S. crinita* only in having a 3-parted style, presumably an error in observation.

DIPLACHNE Beauv. 80.

"Inflorescence paniculate; panicle simple, the branches numerous, alternate, filiform; glumes 7 to 9-flowered, the upper mucronate; lemma 2-laciniate, bearing a bristle between the lobes; palea subtruncate, emarginate."

Festuca fascicularis Lam., the only species, is the type=*Leptochloa* Beauv.

Diplachne fascicularis Beauv. 81, 160. *pl. 16. f. 9.* Based on *Festuca fascicularis* Lam.=*Leptochloa fascicularis* (Lam.) Gray.

TRIPLASIS Beauv. 81.

"Inflorescence spicate; spike compound; branches alternate, simple, spikelet-bearing at the apex; glumes membranaceous, acute, 4-flowered, the florets pedicellate, the uppermost incomplete, abortive; lemma and palea unequal, the lemma bifid, deeply cleft, the midnerve produced into a long bristle between the subulate lobes; apex of palea entire, extrorsely pilose, reflexed."

Triplasis americana is the only species. Genus valid.

Triplasis americana Beauv. 81. *pl. 16. f. 10.* "Communiquée par M. Delille, des États-Unis d'Amerique." Valid.

GEN. LXXIII. ENNEAPOGON Desv.; Beauv. 81.

"Inflorescence spicate; spike simple; spikelets few, 2 or 3-flowered; glumes longer than the florets; lemma with nine bristles bearded on the margins; palea entire, muticous."

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[153] Syn. Pl. 1: 72. 1805.

[154] Syn. Mitteleur. Fl. 2: 311. 1900.

Enneopogon desvauxii, the species figured, is taken as the type=*Pappophorum* subgenus; regarded as valid by Rendle,[155] Stapf,[156] and others.

Enneapogon desvauxii Beauv. 82. 161. *pl. 16. f. 11.* No locality is given. Desvaux [157] in discussing the genus states that he has examined a "plante des îles Manilles." No species of *Enneapogon* or *Pappophorum* is known from the Philippines.[158] Desvaux refers *E. desvauxii* Beauv. to *E. gracile* (R. Br.) Desv. Bentham [159] refers the four species of *Pappophorum* described by Brown to *P. nigricans* R. Br., the first one.

Enneapogon gracilis Beauv. 82, 161, 171. Based on *Pappophorum gracile* R. Br.

Enneapogon nigricans Beauv. 82, 161, 171. Based on *Pappophorum nigricans* R. Br.

Enneapogon pallidus Beauv. 82, 162, 171. Based on *Pappophorum pallidum* R. Br.

Enneapogon purpurascens Beauv. 82, 162, 171. Based on *Pappophorum purpurascens* R. Br.

RABDOCHLOA Beauv. 84.

"Inflorescence paniculate; panicle simple, the branches few or fascicled, simple, filiform; spikelets subunilateral; glumes 3 to 5-flowered, shorter than the florets; lemma with a bristle below the crenate apex; palea entire.

Rabdochloa domingensis, the species figured, is taken as the type=*Leptochloa* Beauv.

Rabdochloa cruciata Beauv. 84, 158, 176. Based on *Agrostis cruciata* L. This is referred to *Chloris cruciata* and the latter to *Rabdochloa*=*Chloris cruciata* (L.) Swartz.

Rabdochloa domingensis Beauv. 84, 159, 176. *pl. 17. f. 3.* "*Cynosurus domingensis* Pers." is referred to *Rabdochloa*. In Persoon's work [160] the name is *Eleusine domingensis*, based on *Cynosurus domingensis* Jacq.=*Leptochloa domingensis* (Jacq.) Trin.

Rabdochloa monostachya Beauv. 84, 159. Based on *Cynosurus monostachyus* Vahl. *Chloris monostachya* Poir. (not Michx. 1803) is based on this. Referred by Kunth [161] to *Chloris distachya* Kunth.

Rabdochloa mucronata Beauv. 84, 158, 176. Based on *Chloris mucronata* Michx.=*Dactyloctenium aegyptium* (L.) Richt.

Rabdochloa virgata Beauv. 84, 158. *Cynosurus virgatus* is given (page 84) under *Rabdochloa*, but in the index ("Lin" as author) it is referred to *Leptochloa*. *Chloris virgata* Swartz is referred to *Rabdochloa* (page 158). The two names were evidently confused. *Chloris virgata* Swartz is true *Chloris*; *Cynosurus virgatus* L. is *Leptochloa virgata* (L.) Beauv., cited by Beauvois under *Leptochloa* and listed in index.

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[155] Cat. Afr. Pl. Welwitsch **2**[1]: 229. 1899.

[156] Thiselt. Dyer, Fl. Cap. **7**: 654. 1900.

[157] Journ. de Bot. Desv. **1**: 69. 1813.

[158] For unreliability of localities cited by Desvaux see Hitchc. & Chase, Contr. U. S. Nat. Herb. **15**: 166. 1910.

[159] Fl. Austral. **7**: 600. 1878.

[160] Syn. Pl. **1**: 86. 1805.

[161] Rév. Gram. **1**: 291. *pl.* 57. 1830.

GEN. LXXVI. KOELERIA L.

Koeleria avenacea Beauv. 166. Name only.

Koeleria pubescens Beauv. 85, 166. Name only. "*Aira pubescens* Lin." is cited under *Koeleria*. Linnaeus did not publish this name. *Aira pubescens* Vahl (page 149) is referred to *Koeleria villosa*.

Koeleria pyramidata Beauv. 84, 166, 175. Based on *Poa pyramidata* Lam.= *Koeleria cristata pyramidata* (Lam.) Pers.

GEN. LXXVII. DACTYLIS L.

Dactylis brevifolia "Koel. Wild."; Beauv. 85, 159. Willdenow[162] credits the name to Koenig and cites "*Dactylis lagopoides* [L.] Mant. 33" (1767), explaining that Koenig's plant is the same as that, but not the same as that of the second edition of the Mantissa (1771) nor of Burmann (1768). (See below.) Several names have been based on *Dactylis brevifolia* Koen. in Willd., *Koeleria brevifolia* Spreng.,[163] *Poa brevifolia* Kunth[164] (not DC. 1806), *Eragrostis brevifolia* Benth.[165] (based on "*Dactylis brevifolia* Roem.," though Roemer and Schultes[166] cite Koenig in Willd.), *Aeluropus brevifolius* Nees; Aschers. & Schweinf.[167] Hooker[168] refers "*D. brevifolia* Koen. ex Willd. (excl. syn.)" to *Eleusine brevifolia* R. Br.; Hook. Durand and Schinz[169] refer it to *Aeluropus brevifolius* (Koen.) Nees.

Dactylis fasciculata "Wild."; Beauv. 159. Referred to *Spartina*. (See page 162.)

Dactylis lagopoides R. Br.; Beauv. 159. Name only; it is not found in Brown's work; probably Linnaeus was meant. Under *Dactylis lagopoides* L.[170] "Bur. ind. t. 10. f. 1. Habitat in India. Burmannus." is cited. Burmann's Flora Indica was published in 1768. The illustration of *Dactylis lagopoides* is plate 12, figure 2. It seems probable that Linnaeus had a plant from Burmann and that he saw manuscript or proofsheets of his work, the number of the plate and figure being subsequently changed. In the second edition[171] Linnaeus cites "Mant. 33" but gives a new description which includes some characters in Burmann's description and which does not seem to apply to the species of 1767. *Koeleria lagopoides* Panz.[172] and *Aeluropus lagopodioides* Trin.[173] are based on *D. lagopoides* L. (1767). Several other names are based on *D. lagopoides* Burm. (1768). It is possible that "R. Br." was a misprint for Burmann.

Dactylis lagopodoides L. Beauv. 159. Evidently an error for *D. lagopoides* L.; referred in the index to *D. brevifolia*. (See above.)

Dactylis stricta Pers.; Beauv. 160. Referred to *Spartina*. In Persoon's work[174] "*Dactylis stricta* Smith" is changed to *Limnetis pungens* Rich.

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[162] Sp. Pl. 1: 410. 1797.
[163] Pl. Pugill. 2: 21. 1815.
[164] Rév. Gram. 1: 111. 1829.
[165] Hook. Icon. Pl. 51. *pl. 1368*. 1881.
[166] Syst. Veg. 2: 630. 1817.
[167] Mem. Inst. Egypt 2: 173. 1889.
[168] Fl. Brit. Ind. 7: 295. 1896.
[169] Consp. Fl. Afr. 5: 901. 1894.
[170] Mant. Pl. 33. 1767.
[171] Mant. Pl. ed. 2 (appendix) 557. 1771.
[172] In Spreng. Syst. Veg. 1: 332. 1825.
[173] In Thwaites, Enum. Pl. Zeyl. 374. 1864.
[174] Syn. Pl. 1: 72. 1805.

Smith credits the name to "Soland. in Ait. Hort. Kew," but Solander's name does not appear in connection with *D. stricta* Ait.=*Spartina maritima* (Curt.) Fernald.

Gen. LXXVIII. CALOTHECA Desv.

Calotheca brizoidea Beauv. 86, 155, 157. *pl. 17. f. 6.* Based on *Briza erecta* Lam. Valid in *Briza.*

Calotheca elegans Beauv. 86, 157. *pl. 17. f. 7.* "*Cascoelytrum elegans* Desv.", an unpublished name, is cited but the source of the specimen is not given. *Briza elegans* (Beauv.) Doell (not Osbeck, 1757) is based on *Calotheca elegans.* Doell cites *Bromus brizoides* Lam. as synonym. Lamarck's brief description, based on a plant collected by Commerson at Monte Video, applies well to this species. Parodi [175] identifies them as the same species=*Briza brizoides* (Lam.) Kuntze.

TRICHAETA Beauv. 86.

"Inflorescence spicate; spike simple; spikelets crowded; glumes acute, hispid on the back, 2 or 3-flowered; lemma hispid on the back, with a flexuous, divergent bristle below the bisetose apex; palea bifid-dentate."

Bromus ovatus Cav. is the only species cited=*Trisetum* Pers.

Trichaeta ovata Beauv. 86, 156, 179. *pl. 17. f. 8.* Based on *Bromus ovatus* Cav. [not Gaertn. 1770]=*Trisetum ovatum* (Cav.) Pers. (There seems to be no tenable name.)

Gen. LXXXI. TRISETUM Pers.

Trisetum alpestre Beauv. 88, 153. Based on *Avena alpestris* Host. Valid.

Trisetum distichophylla Beauv. 88, 153. "*Avena distichophylla* Lin." is referred to *Trisetum.* Probably *A. distichophylla* Vill. was meant. Valid.

Trisetum flavescens Beauv. 88, 153. *pl. 3. f. 8; pl. 18. f. 1.* Based on *Avena flavescens* L. Valid.

Trisetum forskalii Beauv. 88, 153, 180. "*Avena forskalii* Vahl, Wild." and "*Trisetaria* Forsk." are referred to *Trisetum*, the first with a query. These two citations refer to very different species. *Avena forskalii* Vahl [176] is based on "*Avena pensylvanica* [misapplied by] Forsk." [177] These two names are cited by Willdenow.[178] No specific name is given with the generic and specific description of *Trisetaria* Forsk.,[179] but *Trisetaria linearis* is listed on page LX under Flora Aegyptiaca. *T. forskalii* J. F. Gmel. (1791) is based on Forskäl's supposedly unnamed species. *Trisetum forskalii* Beauv. may have been based on *Trisetaria forskalii,* but Beauvois nowhere cites Gmelin. It seems more probable that he supposed *Avena forskalii* and *Tristetaria* [*linearis*] to be the same. *Trisetaria linearis* Forsk. is valid. *Avena forskalii* Vahl is a species of *Danthonia; D. forskalii* Trin.[180] is based on "*Trisetum forskali* Pal. [Beauv.] R. et S. II. p. 658." Roemer and Schultes cite *Avena forskali* Vahl and "*Avena pensylvanica* Forsk." under *Trisetum forskalii* Beauv. Wherefore *Avena forskalii* is taken as the basis=*Danthonia forskalii* (Vahl) Trin.

Trisetum loefflingii Beauv. 88, 153, 180. (Spelled "*loaflingi*" on page 88.) Based on "*Avena Loëfflingia* Lin." (error for *A. loeflingiana*)=*T. loeflingiana* (L.) Beauv.

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[175] Revis. Fac. Agron. Vet. **3**: 130. 1920.
[176] Symb. Bot. **2**: 25. 1791.
[177] Fl. Aegypt. Arab. 23. 1775.
[178] Sp. Pl. **1**: 447. 1797.
[179] Fl. Aegypt. Arab. 27. 1775.
[180] Gram. Icon. **1**: 49. 1828.

Trisetum macrum Beauv. 88, 153. *Avena macra* without author is referred to *Trisetum*. *Avena macra* Stev.[181] was probably intended. That is *Ventenata macra* (Stev.) Boiss. & Bal.

Trisetum pungens Beauv. 88. Name only.

Trisetum sesquiterium Beauv. 88, 154. "*Avena sesquiteria* Lin." is referred to *Trisetum*. Error for *A. sesquitertia* L. (*Avena*, species uncertain).

Trisetum subspicatum Beauv. 88, 149. Based on *Aira subspicata* L.=*Trisetum spicatum* (L.) Richt.

Trisetum villosum Beauv. 88, 180. Name only.

GEN. LXXXII. AVENA L.

Avena bifida Beauv. 89, 153, 155. Based on *Bromus bifidus* Thunb. Referred by Franchet and Savatier[182] to *Trisetum cernuum* Trin.

Avena capillacea Beauv. 89, 153. Name only.

Avena magellanica Beauv. 89, 153. Name only.

Avena nigra "C. B." Beauv. 154. A pre-Linnaean name of Caspar Bauhin's referred to *A. sativa*.

Avena praecox Beauv. 89, 149, 154. Based on *Aira praecox* L.=*Aspris praecox* (L.) Nash.

Avena pulchella Beauv. 89, 149, 154. *Aira pulchella* without author is referred to *Avena*. Presumably *A. pulchella* Willd. was meant. *Deschampsia pulchella* Trin. is based on this. Valid in *Aira*.

Avena spicaeformis Beauv. 154. Name only, referred to *Danthonia*.

Avena vesca "Lob." Beauv. 154. A pre-Linnaean name of Lobelius referred to *A. sativa*.

CORYNEPHORUS Beauv. 90.

"Inflorescence paniculate; panicle compound; glumes membranaceous, 2-flowered, longer than the florets; lemma entire, awned from the base, the awn jointed and hairy in the middle, the lower part coriaceous, twisted, filiform, the upper part clavate, smooth; palea bifid-dentate."

Corynephorus canescens, the species figured, is taken as the type=*Weingaertneria* Bernh.

Corynephorus articulatus Beauv. 90, 149, 159. "*Aira articulata* Lin." is referred to *Corynephorus*. Desfontaines, not Linnaeus, published the name=*Weingaertneria articulata* (Desf.) Aschers. & Graebn.

Corynephorus canescens Beauv. 90, 149, 159. *pl. 3. f. 9; pl. 18. f. 2.* Based on *Aira canescens* L.=*Weingaertneria canescens* (L.) Bernh.

DESCHAMPSIA Beauv. 91.

"Inflorescence paniculate; panicle compound; glumes 2 or 3-flowered, longer than the florets; lemma many-toothed at the apex, awned from the base, the awn straight, scarcely longer than the lemma; palea bifid-dentate."

Deschampsia caespitosa, the species figured, is taken as the type=*Aira* L.[183]

Deschampsia caespitosa Beauv. 91, 149, 160. *pl. 3. f. 31*; *pl. 18. f. 3.* Based on *Aira caespitosa* L. Valid in *Aira*.

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[181] In Bieb. Fl. Taur. Cauc. **1**: 77. 1808.

[182] Enum. Pl. Japon. **2**: 173. 1879.

[183] For discussion of the type of *Aira* L. see Hitchcock, Genera of Grasses of the United States, U. S. Dept. Agr. Bull. **772**: 114. 1920.

Deschampsia discolor Beauv. 149, 160. "*Aira discolor* Lin." is referred to *Deschampsia*. Thuillier, not Linnaeus, is the author. Referred by Ascherson and Graebner [184] to *A. setacea* Huds.

Deschampsia juncea Beauv. 91, 149, 160. *Aira juncea*, without author, is referred to *Deschampsia*. Presumably *A. juncea* Vill. is meant. That is referred by Ascherson and Graebner [185] to *A. media* Gouan.

Deschampsia parviflora Beauv. 91, 149, 160. "*Aira parviflora* Lam." is referred to *Deschampsia*. Lamarck and DeCandolle [186] give *A. parviflora* Thuil. as β under *Aira caespitosa* L.

Gen. LXXXV. DANTHONIA Lam. & DC.

Danthonia glumosa Beauv. 92, 153, 160. Based on *Avena glumosa* Michx.= *Danthonia spicata* (L.) Beauv.

Danthonia penicillata R. Br.; Beauv. 92, 153, 160. Based on *Arundo penicillata* Labill. The combination is credited to R. Brown=*Danthonia racemosa penicillata* (Labill.) Benth.

Danthonia purpurea Beauv. 154, 160. Based on *Avena purpurea* L. f. "Martinique" is given as the locality in the original publication. The description [187] indicates a species of *Danthonia*, but does not apply to either of the two species of *Danthonia* known from the West Indies. It is probable, as suggested by Willdenow,[188] that the locality is erroneous. Thunberg [189] includes *A. purpurea* (no author cited) among South African plants, with a diagnosis, partly taken from Linnaeus. Roemer and Schultes,[190] Nees,[191] and Stapf [192] regard *A. purpurea* L. f. as being the same as *A. purpurea* Thunb., and a valid species of *Danthonia* in South Africa.

Danthonia ramosa R. Br.; Beauv. 92, 160. Presumably an error for *D racemosa* R. Br.

Danthonia setacea Beauv. 92, 160. No author is given, presumably *D. setacea* R. Br. is intended. Roemer and Schultes [193] erroneously refer *Danthonia setacea* Beauv. to *Avena setacea* Vill. Beauvois lists *Avena setacea* Vill. in the index but does not refer it to *Danthonia*.

Danthonia spicaeformis Beauv. 160. Name only; *Avena spicaeformis*, name only, is referred to *Danthonia*. Roemer and Schultes [194] cite these names as synonyms of *D. spicata* (L.) Beauv.

Danthonia strigosa Beauv. 154, 160. Based on *Avena strigosa* Schreb. Valid in *Avena*.

PENTAMERIS Beauv. 92.

"Inflorescence paniculate; panicle subsimple; glumes membranaceous, 2-flowered, longer than the florets; lemma broad, emarginate, with 4 bristles, awned in the middle, the awn twisted, bent, ribbon-like; palea subtruncate, emarginate."

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[184] Syn. Mitteleur. Fl. **2**: 288. 1899.
[185] Syn. Mitteleur. Fl. **2**: 295. 1899.
[186] Fl. Franç. **3**: 45. 1805.
[187] L. f. Suppl. Pl. 112. 1781.
[188] Sp. Pl. **1**: 450. 1797.
[189] Prodr. Pl. Cap. 23. 1794.
[190] Syst. Veg. **2**: 690. 1817.
[191] Fl. Afr. Austr. 326. 1841.
[192] Thiselt. Dyer, Fl. Cap. **7**: 530. 1898.
[193] Mant. **2**: 373. 1824.
[194] Syst. Veg. **2**: 690. 1817.

Pentameris thuarii is the only species=*Danthonia*, subgenus. Regarded as valid by Stapf.[195]

Pentameris thûarii Beauv. 93. *pl. 3. f. 30; pl. 18. f.* 8. "Communiquée par M. Dupetit-Thouars." No locality given, probably Madagascar or South Africa=*Danthonia thuarii* (Beauv.) Desv.

Eriachne pallens Beauv. 93, 162. Error for *E. pallescens* R. Br.

GAUDINIA Beauv. 95.

"Inflorescence spicate; spike compound; spikelets sessile, alternate, 9 to 11-flowered, the florets distichous; glumes unequal, obtuse; lemma bifid-dentate, awned on the back above the middle, the awn twisted; palea 2 or 4-toothed."

Avena fragilis L., the species figured (as *G. avenacea*), is the type. Genus valid.

Gaudinia avenacea Beauv. Atlas 13. *pl. 19. f. 5.* This name is in the Atlas only, obviously based on *Avena fragilis* L.=G. *fragilis.*

Gaudinia fragilis Beauv. 95, 153, 164. Based on *Avena fragilis* L. Valid.

Gaudinia planiculmis Beauv. 95, 154, 164. "*Avena planiculmis* Wild." is referred to *Gaudinia.* Willdenow[196] gives Schrader as author. Valid in *Avena.*

Beckmannia erucoides Beauv. 96, 155. *pl. 19. f. 6*, and *Phalaris erucoides* L., referred to it, are evidently errors for *erucaeformis.*

CATABROSA Beauv. 97.

"Inflorescence paniculate; panicle compound; glumes 2 to 5-flowered, shorter than the florets, and like the lemma subtruncate, erose-denticulate; palea nearly trifid."

Aira aquatica L., illustrated, is the type. Genus valid.

Catabrosa aquatica Beauv. 97, 149, 157. *pl. 19. f.* 8. Based on *Aira aquatica* L. Valid.

Catabrosa verticillata Beauv. 97, 157. *Poa verticillata* Poir. is cited. Poiret[197] credits the species to Cavanilles. (See *Eragrostis verticillata*, page 180.)

SCLEROCHLOA Beauv. 97.

"Inflorescence spicate; spike simple; spikelets unilateral or dichotomous; glumes 3 to 5-flowered, obtuse, shorter than the florets; lemma cordate-emarginate, obtuse; palea entire."

Sclerochloa dura, the species illustrated, is the type. Genus valid.

Sclerochloa divaricata Beauv. 98, 174, 177. "*Poa divaricata* Wild." is referred to *Sclerochloa.* Willdenow[198] gives Gouan as author=*Sphenopus divaricatus* (Gouan) Reichenb.

Sclerochloa dura Beauv. 98, 174, 177. *pl. 19. f. 4.* "*Poa dura* Lin." is cited under the genus. In the index "*Poa dura* Lin." and "*Cynosurus durus* Hoffm." are referred to *Sclerochloa.* The species was published by Linnaeus as *Cynosurus durus.* Valid.

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[195] Thiselt. Dyer, Fl. Cap. **7**: 512. 1898.
[196] Enum. Pl. **1**: 124. 1809.
[197] Lam. Encycl. **5**: 91. 1804.
[198] Sp. Pl. **1**: 402. 1797.

Sclerochloa procumbens Beauv. 98, 175, 177. "*Poa procumbens* Smith, Pers." is referred to *Sclerochloa*. Persoon [199] cites "Smith, brit. p. 99" [98]. J. E. Smith [200] gives Curtis as author=*Puccinellia rupestris* (With.) Fern. & Weath.[201]

GEN. LXXXVIII. DINEBA Delile.

Beauvois credits the name to Delile. Delile [202] says "I collected this plant at Damiette in a field of sugarcane in December 1798; sent seed to France in 1802; it grew well and has since been widely distributed in gardens under the name *Dinaeba* which I had given it. I formed the name from the Arabic word Denab, which means queue." Some of the plants reached the botanic garden at Vienna. Jacquin [203] says that garden had received the plant under the name "*Dinebra arabica*, new genus, which name, ignorant of the author, I take up." *Dinebra* being the earlier is generally accepted. *D. arabica*=*D. retroflexa* (Vahl) Panz.

Dineba americana Beauv. 98, 160. *pl. 16. f. 3.* Based on *Aristida americana* L.=*Bouteloua americana* (L.) Scribn.

Dineba curtipendula Beauv. 98, 158, 160. *pl. 16. f. 1.* *Melica curtipendula* Michx. and *Chloris curtipendula* Pers. are referred to *Dineba*. Persoon [204] credits this species to Michaux. The species had not been published under *Melica*=*Bouteloua curtipendula* (Michx.) Torr.

Dineba divaricata Beauv. 160. Name only.

Dineba lima Beauv. 98, 160. "*Cynosurus lima* Loeff., Pers." is referred to *Dineba*. Persoon [205] cites "Loefl. it. 41." Loefling's work was published in 1758. Linnaeus [206] describes this species from Spain, giving "Loefl." after the diagnosis. Doubtless the plant was received with the name or diagnosis from Loefling=*Wangenheimia lima* (L.) Moench; Trin.

Dineba melicoides Beauv. 160. Name only.

Dineba paspaloides Beauv. 98, 159, 160. Based on *Dactylis paspaloides* Willd. Willdenow [207] cites "*Dinebra arabica* Hortulan" and *Cynosurus retroflexus* Willd., both names referring to *Dinebra arabica* Jacq.=*Dinebra retroflexa* (Vahl) Panz.

SCHEDONORUS Beauv. 99.

"Inflorescence paniculate, the rachis articulate; panicle compound, the ultimate pedicels inflated, cuneiform; glumes 5 to 15-flowered, shorter than the florets; lemma with a bristle below the shortly emarginate-dentate apex, the teeth often barbed; palea bifid-dentate."

Schedonorus elatior, based on *Festuca elatior* L., the species figured, is the type=*Festuca* L. Spelled *Schenodorus* in the index, but the derivation given shows *Schedonorus* to be correct.

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[199] Syn. Pl. 1: 92. 1805.
[200] Fl. Brit. 1: 98. 1800.
[201] See Rhodora 18: 11. 1916, for discussion.
[202] Fl. Egypt. 26. *pl. 11. f. 3.* 1813.
[203] Fragm. Bot. Illustr. 77. *pl. 121. f. 1.* 1809.
[204] Syn. Pl. 1: 88. 1805.
[205] Syn. Pl. 1: 86. 1805.
[206] Sp. Pl. 72. 1753.
[207] Enum. Pl. 111. 1809.

Schedonorus altissimus Beauv. 99, 177. Based on *Festuca altissima* All. Valid in *Festuca*. Referred by Hackel[208] to *F. silvatica* Vill. [1787, not Huds. 1762].

Schedonorus auratus Beauv. 99, 177. Based on *Festuca aurata* Gaudin= A variety of *Festuca rubra* L.

Schedonorus aureus Beauv. 99, 177. Based on *Festuca aurea* Lam. On page 162, "Lin." is erroneously given as author. A variety of *Festuca spadicea* L.

Schedonorus calamarius Beauv. 99, 177. Based on *Festuca calamaria* Smith. Referred by Hackel[208] to *F. silvatica* Vill. (not Huds.)=*F. altissima* All.

Schedonorus curvatus Beauv. 99, 174, 177. *Poa curvata* and *Festuca curvata*, both without author, are referred to *Schedonorus*. All are names only.

Schedonorus dumetorum Beauv. 99, 162, 177. "*Festuca dumetorum* Wild." is referred to *Schedonorus*. Willdenow[209] gives Linnaeus as author, copying his description=*Festuca rubra* subsp. *dumetorum* (L.) Hack.

Schedonorus elatior Beauv. 99, 156, 177. *pl. 19. f. 2.* "Lin." is given as author of *Bromus elatior* on page 99 and "Koel." on page 156. Both are referred to *Schedonorus*. *Bromus elatior* Koel. is based on *Festuca elatior* L. Valid in *Festuca*.

Schedonorus eskia Beauv. 99, 177. *Festuca eskia* without author is referred to *Schedonorus*=*Festuca varia* subsp. *eskia* (Ramond) Hack.

Schedonorus gerardi Beauv. 99, 163, 177. Based on *Festuca gerardi* All.

Schedonorus glaucus Beauv. 99, 163, 177. Based on *Festuca glauca* Lam.= *Festuca ovina* var. *glauca* (Lam.) Fries.

Schedonorus inermis Beauv. 99, 177. *Festuca inermis* without author is referred to *Schedonorus*. Doubtless *F. inermis* DC. is intended=*Bromus inermis* Leyss.

Schedonorus littoralis Beauv. 99, 163, 177. Based on *Festuca littoralis* Labill. Valid in *Festuca*.

Schedonorus loliaceus Beauv. 99, 163, 177. Based on *Festuca loliacea* Huds. Probably a form of *F. elatior* L.

Schedonorus nigrescens Beauv. 99, 163, 177. Based on *Festuca nigrescens* Lam. Referred by Hackel[210] to a form of *F. rubra* var. *fallax* Hack.

Schedonorus pilosus Beauv. 99, 163, 177. Based on *Festuca pilosa* Gaudin [in Hall.]. Referred by Hackel[211] and by Ascherson and Graebner[212] to *Poa violacea* Bell.

Schedonorus poaeformis Beauv. 99, 163, 177. Based on *Festuca poaeformis* Host. Referred by Hackel[211] and by Ascherson and Graebner[212] to *Poa violacea* Bell.

Schedonorus pratensis Beauv. 99, 163, 177. Based on *Festuca pratensis* Huds.=*Festuca elatior* L.

Schedonorus pulchellus Beauv. 99, 163, 177. Based on *Festuca pulchella* Schrad. Valid in *Festuca*.

Schedonorus rhaeticus Beauv. 99, 163, 177. Based on *Festuca rhetica* without author, presumably Suter. Referred by Hackel[211] and by Ascherson and Graebner[212] to *Poa violacea* Bell.

Schedonorus scheuchzeri Beauv. 99, 163, 177. Based on *Festuca scheuchzeri* Gaudin. Referred by Hackel[213] to *F. pulchella* Schrad.

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[208] Monogr. Fest. Eur. 199. 1882.
[209] Sp. Pl. 1: 422. 1797.
[210] Monogr. Fest. Eur. 142. 1882.
[211] Monogr. Fest. Eur. 200. 1882.
[212] Syn. Mitteleur. Fl. 2: 435. 1900.
[213] Monogr. Fest. Eur. 192. 1882.

Schedonorus serotinus Beauv. 99, 163, 177. Based on *Festuca serotina* L.= *Molinia serotina* (L.) Mert. & Koch.

Schedonorus sylvaticus Beauv. 99, 163, 177. Based on *Festuca sylvatica* [*silvatica*] Vill. Probably *F. altissima* All. (See above.)

Schedonorus tenellus Beauv. 99, 163, 177. Based on *Festuca tenella* Willd.=*F. octoflora* Walt.

Schedonorus varius Beauv. 99, 164, 177. Name only. "*Festuca varia* Lin." is cited (page 99) and in the index is referred to *Schedonorus*. Linnaeus did not publish this species. *Festuca varia* Jacq. is referred to *F. pumila* and *F. varia* Schrad. is referred (page 164) to *F. flavescens* without author.

Schedonorus violaceus Beauv. 99, 177. Based on *Festuca violacea* Gaudin= *F. rubra* subsp. *violacea* (Gaudin) Hack.

Gen. LXXXIX. FESTUCA L.

Festuca curvata Beauv. 99, 162. Name only, referred to *Schenodorus* [*Schedonorus*].

Festuca distans Beauv. 162. Name only, referred to *Poa*.

BRACHYPODIUM Beauv. 100.

"Inflorescence spicate, the rachis articulate; spike compound; spikelets alternate on each joint of the rachis, pedicellate, the pedicels broad, thick; glumes 5 to 13-flowered, shorter than the florets, lemma and palea entire, the lemma with a bristle at the apex; palea obtuse, truncate, scarcely emarginate, the margins often with rigid reflexed hairs."

Brachypodium pinnatum, the species figured, is taken as the type. Genus valid.

Brachypodium cenesium Beauv. 101, 155, 174. *Poa cenisia* (also spelled *cenesia*), without author, is referred to *Brachypodium*. Presumably Allioni's species was intended. Valid in *Poa*.

Brachypodium ciliatum Beauv. 101, 155. Based on *Bromus ciliatus* Lam. Valid in *Bromus*.

Brachypodium commutatum Beauv. 101, 155. "*Bromus commutatus* Lam." is referred to *Brachypodium*. This name is not found in Lamarck's works; evidently an error for *Bromus commutatus* Schrad. Valid in *Bromus*.

Brachypodium distachyum Beauv. 101, 155, 156. Based on *Bromus distachyos* L. Valid.

Brachypodium festucoides Beauv. 101, 155, 180. *Triticum festucoides*, without author, is referred to *Brachypodium*. Probably *T. festucoides* Bertol. is intended. That is referred by Ascherson and Graebner[214] to a variety of *Festuca lachenalii* Spenn.

Brachypodium fragile Beauv. 100, 155, 180. Based on *Triticum fragile* Roth. This species described from a cultivated plant has not been identified.

Brachypodium gracile Beauv. 101, 155, 156. "*Bromus gracilis* Roth, Wild." is referred to *Brachypodium*. Willdenow[215] cites both Leysser and Weigel. According to Ascherson and Graebner[216] two species were described, that of Leysser (1761) being referred to *Brachypodium pinnatum* forma *gracile* (Leyss.) Posp., and that of Weigel to *Brachypodium sylvaticum* (Huds.) Roem. & Schult.

Brachypodium halleri Beauv. 101, 155, 163. Name only. *Festuca halleri*, without author, is cited on page 101. In the index *F. halleri* "Vill., Pers."

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[214] Syn. Mitteleur. Fl. **2**: 539. 1900.

[215] Sp. Pl. **1**: 438. 1797.

[216] Syn. Mitteleur. Fl. **2**: 633, 635. 1901.

is not referred to any other genus, neither is it cited under *Festuca*. (*Brachypodium halleri* Roem. & Schult., is based on *Triticum halleri* Viv., not on *Festuca halleri* Vill.)

Brachypodium loliaceum Beauv. 101, 155, 180. "*Triticum loliaceum* Huds." is referred to *Brachypodium*. *T. loliaceum* Smith, is based on *Poa loliacea* Huds.=*Catapodium loliaceum* (Huds.) Link.

Brachypodium longifolium Beauv. 101, 155, 156. "*Bromus longifolius* Pers." is referred to *Brachypodium*. Persoon [217] gives Schousboe as author. Ball [218] suggests that this is a form of *Brachypodium pinnatum*.

Brachypodium nardus Beauv. 101, 155, 180. Based on *Triticum nardus* DC. Referred to *Festuca maritima* L. by Ascherson and Graebner.[219]

Brachypodium nigricans Beauv. 101, 155, 180. Based on *Triticum nigricans* Pers. This species, described from the the coast of Normandy, we are unable to identify.

Brachypodium phleoides Beauv. 155. Name only.

Brachypodium phoenicoides L.; Beauv. 156. Name only, referred to *Brachypodium* "*plucknetii*." *Festuca phoenicoides* Lam. is referred (page 163) to "*Brachypodium ramosum*." (See *Brachypodium ramosum*.) Lamarck [220] gives Linnaeus as author and quotes his diagnosis.

Brachypodium pinnatum Beauv. 101, 155. *pl. 19. f. 3.* Based on *Bromus pinnatus* L. Valid.

Brachypodium plucknetii [plukenetii] Beauv. 101, 155. "*Bromus plucknetii*," without author, is referred to *Brachypodium*. Presumably Allioni's species is intended = *Brachypodium ramosum* var. *plukenetii* (All.) Aschers. & Graebn.

Brachypodium poa Beauv. 155. "*Poa loliacea* Huds." is referred to *Brachypodium* (page 175). "*Triticum loliaceum* Huds." had already been transferred to *Brachypodium*. It is probable that *B. poa* is a change of name for *Poa loliacea*. *Triticum loliaceum* Smith is based on *Poa loliacea* Huds. (See above.)

Brachypodium ramosum Beauv. 163. *Festuca phoenicoides* Lam. is referred to *Brachypodium ramosum*. This is the only place the latter name is found, *Bromus ramosus* L. being referred (page 156) to *Brachypodium plukenetii*. Roemer and Schultes [221] publish *Brachypodium ramosum*, based on *Bromus ramosus* L.

Brachypodium retusum Beauv. 101, 155. Based on *Bromus retusus* Pers. Probably a form of *Brachypodium ramosum* (L.) Roem. & Schult.

Brachypodium rottboella Beauv. 155, 180. Based on *Triticum rottboella* DC.=*Catapodium loliaceum* (Huds.) Link.

Brachypodium silvaticum Beauv. 101, 155, 156. *pl. 3. f. 11.* "*Bromus sylvaticus* Lin." is referred to *Brachypodium*. Linnaeus did not publish the name. *Bromus sylvaticus* Pollich, based on *Festuca sylvatica* Huds., is presumably the species intended. The illustration is identifiable. The name is spelled "*sylvaticus*" on pages 101 and 156. Valid.

Brachypodium tenellum Beauv. 101, 155, 181. Based on *Triticum tenellum* L. which is referred to *Festuca lachenalii* Spenn. by Ascherson and Graebner,[222] (though they refer *Brachypodium tenellum* Beauv. (based upon it) to *Festuca maritima* L.).

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[217] Syn. Pl. 1: 96. 1805.
[218] Spicil. Fl. Marocc. in Linn. Soc. Journ. Bot. 16: 731. 1878.
[219] Syn. Mitteleur. Fl. 2: 540. 1900.
[220] Encycl. 2: 462. 1786.
[221] Syst. Veg. 2: 737. 1817.
[222] Syn. Mitteleur. Fl. 2: 538. 1900.

Brachypodium tenue Beauv. 155. Name only. *Triticum tenue*, a name only, is cited (page 101) under *Brachypodium*.

Brachypodium unilaterale Beauv. 155. Name only. Roemer and Schultes[223] publish *B. unilaterale* based on *Triticum unilaterale* L. Beauvois refers *T. unilaterale*, without author, to *Agropyron*.

GEN. XC. AGROPYRON Gaertn.

Agropyron caninum Beauv. 102, 146, 180. "*Triticum caninum* Schreb." is referred to *Agropyron*. Schreber[224] cites *Elymus caninus* L.[225] which is based on *Triticum caninum* L. (first edition). Valid.

Agropyron capillare Beauv. 102, 146. Name only. *Triticum capillare*, name only, is cited under *Agropyron*.

Agropyron caudatum Beauv. 102, 146, 180. "*Triticum caudatum* Scheuch." is referred to *Agropyron*. Persoon,[226] the author of *T. caudatum*, cites "Scheuchz. gram. I. f. 4." as a good figure, merely; he describes a plant from Switzerland. Ascherson and Graebner[227] identify *T. caudatum* Pers. with *Secale villosum* L., which is *Haynaldia villosa* (L.) Schur. Persoon's description is too brief to be satisfactory, but Scheuchzer's description applies well to this species.

Agropyron dentiflorum Beauv. 146. Error for *densiflorum*. *Triticum densiflorum* without author is referred (pages 102, 180) to *Agropyron*. Presumably Willdenow's species was intended. That, described from Siberia, Willdenow says is related to *T. intermedium*. (See below.)

Agropyron distichum Beauv. 102, 146, 180. Based on *Triticum distichum* Thunb. Valid.

Agropyron elongatum Beauv. 102, 146, 180. Based on *Triticum elongatum* Host. Valid.

Agropyron intermedium Beauv. 102, 146, 180. *Triticum intermedium*, without author, is referred to *Agropyron*. Presumably Host's species was intended. Valid.

Agropyron junceum Beauv. 102, 146, 180. Based on *Triticum junceum* L. Valid.

Agropyron laevissimum Beauv. 146. Name only.

Agropyron maritimum Beauv. 102, 146, 180. Based on *Triticum maritimum* L.=*Cutandia maritima* (L.) Benth.

Agropyron multiflorum Beauv. 102, 146, 180. "*Triticum multiflorum* Rich." is referred to *Agropyron*. Persoon[228] describes "*β multiflorum*" as a variety of *Triticum repens*, and states that it was observed by Richard. Probably a form of *Agropyron repens* (L.) Beauv.

Agropyron pectinatum Beauv. 102, 146, 180. "*Triticum pectinatum* R. Brow" is referred to *Agropyron*. This is based on *Festuca pectinata* Labill. Valid.

Agropyron prostratum Beauv. 102, 146, 180. "*Triticum prostratum* Lin." is referred to *Agropyron*. *Triticum prostratum* L. f. is based on *Secale prostratum* Pall. Valid.

Agropyron pumilum Beauv. 102, 146, 180. Based on *Triticum pumilum* L. Probably the same as *A. prostratum* (L.) Beauv.

Agropyron repens Beauv. 102, 146, 180. *pl. 20. f. 2.* Based on *Triticum repens* L. Valid.

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[223] Syst. Veg. **2**: 747. 1817.
[224] Spic. Fl. Lips. 51. 1771.
[225] Sp. Pl. ed. 2. 124. 1762.
[226] Syn. Pl. **1**: 110. 1805.
[227] Syn. Mitteleur. Fl. **2**: 672. 1901.
[228] Syn. Pl. **1**: 109. 1805.

Agropyron rigidum Beauv. 102, 146. *Triticum rigidum* without author is cited under *Agropyron*. Presumably Schrader's species was intended. According to Ascherson and Graebner [229] this is the same as *A. elongatum*.

Agropyron scabrum Beauv. 102, 146, 181. *Triticum scabrum* R. Br. is referred to *Agropyron*. This is based on *Festuca scabra* Labill. Valid.

Agropyron sepium Beauv. 102, 146, 181. "*Triticum sepium* Lin." is referred to *Agropyron*. Evidently an error for Lam.=*A. caninum* (L.) Beauv.

Agropyron sibiricum Beauv. 102, 146, 181. "*Triticum sibiricum* Lin." is referred to *Agropyron*. Presumably an error for Willdenow. Valid.

Agropyron tenuiculum Beauv. 146. Name only. *Triticum tenuiculum* is referred (page 181) to *Brachypodium*, but the name is not listed under that genus.

Agropyron unilaterale Beauv. 102, 146. *Triticum unilaterale* without author is referred to *Agropyron*. Presumably Linnaeus' species was intended. Ascherson and Graebner [230] identify *Triticum unilaterale* L., 1767, with *Festuca rottboellia* Aschers. & Graebn., based on "*Triticum rottbolla* Lam. & DC." 1805, which is the same as *Catapodium loliaceum* (Huds.) Link, based on *Poa loliacea* Huds., 1762. *Triticum unilaterale* has been confused with slender forms of *Festuca maritima* L., but Linnaeus' brief description, as well as the Plukenet figure cited [231] agrees with *Catapodium loliaceum* not with *F. maritima* L.=*Catapodium loliaceum* (Huds.) Link.

Ascherson and Graebner,[232] though they clear up the confusion in regard to Linnaeus' two species involved, cloud the matter somewhat by the disposition of certain names. *Agropyron unilaterale* Beauv., *Triticum unilaterale* DC. (credited to Linnaeus, but with the Bauhin synonym excluded), and several other names based on *Triticum unilaterale* L., are placed as synonyms under *Festuca maritima* L., though *Triticum unilaterale* L. itself is referred as a synonym to *Festuca rottboellia* Aschers. & Graebn. (that combination made earlier by Raspail,[233] the specific name spelled "*rottboella*"), based on *Triticum rottbolla* Lam. & DC. [The name *loliacea* is preoccupied in *Festuca*.] In like manner *Brachypodium tenellum* Beauv., based on *Triticum tenellum* L., which Ascherson and Graebner (page 538) refer to *Festuca lachenalii* Spenn., is given as a synonym of *Festuca maritima L.*

Agropyron vaginans Beauv. 102, 146, 181. Based on *Triticum vaginans* Pers. This species described from "Americ. meridionali" has not been identified. The description suggests *Elymus virginicus* L.

GEN. XCI. LOLIUM L.

Lolium procumbens Hall.; Beauv. 166. Referred to *Sclerochloa dura* Beauv. "*Lolium procumbens*" is part of a phrase name used by Haller.[234]

Lolium ramosum "Leer., Pers." Beauv. 166. Presumably based on *Lolium perenne* γ *ramosum* Leers; Pers. Persoon [235] gives Leers as author, and cites "t. 12. f. 1." Leers [236] describes "var. β" with branching spike, and in plate 12, figure 1, shows such a spike=*Lolium perenne ramosum* Leers; Pers.

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[229] Syn. Mitteleur. Fl. **2**: 661. 1901.
[230] Syn. Mitteleur. Fl. **2**: 544. 1900.
[231] Pluk. Phytogr. *pl. 32. f.* 7. 1691.
[232] Syn. Mitteleur. Fl. **2**: 540, 543, 544. 1900.
[233] Ann. Sci. Nat. **5**: 445. 1825.
[234] Nom. Hist. Pl. Helv. 129. 1769.
[235] Syn. Pl. **1**: 110. 1805.
[236] Fl. Herborn. 48. 1775.

Lolium tenellum "Lin."; Beauv. 166. Name only, referred to *Brachypodium.* Presumably an error for *Triticum tenellum* L., which is *Festuca lachenalii* Spenn.

GEN. XCII. TRITICUM L.

Triticum aegilops Beauv. 103, 146, 180. Presumably based on *Aegilops squarrosa,* which is the only species of *Aegilops* referred to *Triticum.* "Schreb. Pers." are cited as authority. Persoon [237] under *A. squarrosa* refers to an illustration in Schreber's Beschreibung der Gräser. Schreber gives Linnaeus as author. Valid, *T. squarrosum* being preoccupied.

Triticum brevissimum Beauv. 102. Name only, cited under *Agropyron*; probably error for *laevissimum.* (See below.)

Triticum capillare Beauv. 180. Name only, referred to *Agropyron.*

Triticum creticum Beauv. 103, 178, 180. *Secale creticum* Tournef. is referred to *Triticum.* This pre-Linnaean name is published by Linnaeus, with the Tournefort phrase name and "glumis extrorsum ciliatis" as the only diagnosis. Desfontaines [238] identifies the Tournefort plant with his own *Hordeum strictum* (which is the same as *H. bulbosum* L.), declaring the Linnaean plant to be distinct. The glumes of *H. bulbosum* are not ciliate. We are unable to identify the Linnaean species.

Triticum festucoides Beauv. 180. Referred to *Brachypodium.* (See *B. festucoides,* page 195.)

Triticum laevissimum Hall.; Beauv. 180. Part of a phrase name,[239] referred to *Triticum polonicum* L.

Triticum multiflorum Rich.; Beauv. 180. Name only, referred to *Agropyron.* (See *A. multiflorum,* page 197.)

Triticum pungens "Lin." Beauv. 180. Error for Pers.

Triticum sativum "Lin."; Beauv. 180. Error for Lam.

Triticum tenue Beauv. 181. Name only, referred to *Brachypodium.*

Triticum tenuiculum Beauv. 181. Name only, referred to *Brachypodium.*

GEN. XCIV. SECALE L.

Secale pumilum L.; Beauv. 178. The Linnaean name is *Triticum pumilum.* This Beauvois tranfers to *Agropyron. Secale pumilum* Pers. is based on *T. pumilum* L. (See *Agropyron pumilum,* page 197.)

Secale triflorum Beauv. 105, 178. "J'ai trouvé cette * * * espèce a Dunkerque." It differs from *S. cereale* only in having a third floret. Probably *S. cereale* L.

GEN. XCVI. ISCHAEMUM L.

Ischaemum striatum "Lin."; Beauv. 166. Name only, referred to *Ischaemum imberbe* Retz.

Ischaemum vulgare Lob.; Beauv. 166. A pre-Linnaean name referred to *Digitaria sanguinalis=Syntherisma sanguinalis* (L.) Dulac.

LODICULARIA Beauv. 108.

"Culm branching; spikes many, simple, alternate or fascicled, articulate-dentate; [240] spikelets not crowded; glumes 2-flowered, longer than the florets; lower floret neuter, the palea wanting; upper floret perfect, the lemma coriaceous, the palea membranaceous."

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[237] Syn. Pl. 1: 107. 1805.
[238] Fl. Atlant. 1: 113. 1798.
[239] Hall. Nom. Hist. Pl. Helv. 130. 1769.
[240] See page 142.

Lodicularia fasciculata is the only species=*Manisuris* L.

Lodicularia fasciculata Beauv. 108, 166. *pl. 21. f. 6.* Based on *Rottboella fasciculata* Desf. This name was first published by Lamarck. Desfontaines fails to cite the author, but his plate shows his species to be Lamarck's=*Manisuris fasciculata* (Lam.) Hitchc.

Lodicularia fastigiata Beauv. Atlas 14. *pl. 21. f. 6.* Error for *fasciculata.*[241]

Rottboëlla monandra Roth; Beauv. 177. Name only, referred to *Monerma.* See *Monerma monandra.*

MEOSCHIUM Beauv. 111.

"Inflorescence spicate, the rachis articulate; spikes 2, paired; glumes subcoriaceous, 2-flowered, longer than the florets; lower floret staminate; upper perfect, the lemma and palea membranaceous, the lemma awned below the bifid-dentate apex, the awn plicate, twisted; the palea entire." (The name is meant for an anagram of *Ischaemum.*)

Meoschium aristatum, the species illustrated, is taken as the type=*Ischaemum* L.

Meoschium aristatum Beauv. 111, 167. *pl. 21. f. 4.* Based on *Ischaemum aristatum* L. Valid in *Ischaemum.*

Meoschium barbatum Beauv. 111, 167. *Ischaemum barbatum* without author is referred to *Meoschium.* Doubtless Retzius is intended=*Ischaemum aristatum* subsp. *barbatum* (Retz.) Hack.

Meoschium ciliare Beauv. 111, 167. Based on *Ischaemum ciliare* Retz. Valid in *Ischaemum.*

ARTHRAXON Beauv. 111.

"Culm branching; inflorescence paniculate, the panicle simple; glumes membranaceous, 2-flowered, longer than the florets; lower floret neuter, the palea wanting; upper floret perfect, the lemma and palea subcoriaceous, the lemma bifid-dentate at the apex, awned from the base, the awn plicate, twisted; the palea entire."

Arthraxon ciliaris is the only species. Genus valid.

Arthraxon ciliaris Beauv. 111, 152. *pl. 11. f. 6.* "Communicated by M. Richard. I have found it only in his herbarium. It was formerly cultivated * * * at Trianon." Valid.

GEN. CI. HORDEUM L.

Hordeum avenaceum Wigg.; Beauv. 165. Name only, referred to *Arrhenatherum.*

Hordeum commune Beauv. 165. Name only, referred to *Zeocriton.*

Hordeum heterostychon "Lin."; Beauv. 114, 165. Name only. The name is spelled *heterostichon* on page 165. It may be an error for *Hordeum hexastichon* L.

Hordeum hystrix Lin.; Beauv. 165. Name only, referred to *Zeocriton.* (See *Z. hystrix*, page 201.)

ZEOCRITON Beauv. 114.

"This genus differs from *Hordeum* only in that the two lateral spikelets are staminate or neuter. While this character is the only distinctive one

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[241] The reverse error is made in *Diectomis*, *D. fastigiata* being given as *D. fasciculata* in the Atlas. See page 207.

for the genus, it appears to me important enough to be considered, otherwise one ceases to be consistent, and it would be necessary to give up the division of the Gramineae into polygamous and hermaphrodite. * * *"

Zeocriton distichum, the species illustrated, is taken as the type=*Hordeum* L.

Zeocriton commune Beauv. 165, 182. Based on *Hordeum zeocriton* L., a form of *H. vulgare* L.

Zeocriton complanatum Beauv. 115, 182. Name only.

Zeocriton distichum Beauv. 115, 165, 182. *pl. 21. f. 2.* Based on *Hordeum distichon* L. Valid in *Hordeum.*

Zeocriton hystrix Beauv. 115, 182. "*Hordeum hystrix* Lin." is referred (page 165) to *Zeocriton.* This may be an error for *Elymus hystrix* L., there being no *H. hystrix. Elymus hystrix* is the type of the genus *Hystrix* Moench.

Zeocriton maritimum Beauv. 115, 165, 182. Based on "*Hordeum maritimum* Hoff., Wild." Willdenow [342] gives Roth as author. Valid in *Hordeum.*

Zeocriton murinum Beauv. 115, 182. Based on *Hordeum murinum* L. Valid in *Hordeum.*

Zeocriton nodosum Beauv. 115, 165, 182. Based on *Hordeum nodosum* L. Valid in *Hordeum.*

Zeocriton rigidum Beauv. 115, 165, 182. Based on *Hordeum rigidum* Roth. Ascherson and Graebner [343] doubtfully refer this to *Hordeum maritimum* Roth.

Zeocriton secalinum Beauv. 115, 165, 182. "*Hordeum secalinum* Lin." is referred to *Zeocriton.* The species was published by Schreber, not Linnaeus. Valid in *Hordeum.*

Zeocriton strictum Beauv. 115, 165, 182. Based on *Hordeum strictum* Desf. = *Hordeum bulbosum* L.

GEN. CII. MICROCHLOA R. Br.

Microchloa indica Beauv. Atlas 13. *pl. 20. f. 8.* This name is found in the Atlas only, but "*Nardus indica* Lin." is referred (page 168) to *Microchloa.* Valid.

GEN. CIII. OPHIURUS Gaertn.

Ophiurus cylindricus Beauv. 116, 168, 176. Based on *Rottboellia cylindrica* Willd.=*Lepturus cylindricus* (Willd.) Trin.

Ophiurus incurvatus Beauv. 116, 168, 176. *pl. 21. f. 3.* Based on *Rottboellia incurvata* L., which is based on *Aegilops incurva* L.=*Pholiurus incurvus* (L.) Schinz & Thell.

Ophiurus pannonicus Beauv. 116, 168, 177. Based on *Rottboellia pannonicu* Host.=*Pholiurus pannonicus* (Host) Trin.

MONERMA Beauv. 116.

"Inflorescence spicate, the rachis articulate-dentate; spike simple; spikelets subimmersed in the excavations of the rachis; glume 1, cartilaginous, sulcate; lemma and palea membranaceous-hyaline."

Monerma monandra, the species illustrated, is taken as the type=*Lepturus* R. Br.

Monerma monandra Beauv. 117, 168, 177. *pl. 20. f. 10.* "*Rottboella monandra* Lin." (page 117) and "*R. monandra* Roth" (page 177) are referred to *Monerma.* No species has been described as *R. monandra,* but plate 20, figure

[342] Sp. Pl. 1: 475. 1797.

[343] Syn. Mitteleur. Fl. 2: 737. 1902.

10, is recognizable as *Lepturus cylindricus* (Willd.) Trin. The source of the specimen is not given.

Monerma repens Beauv. 117, 168, 177. Based on *Rottboellia repens* Forst.= *Lepturus repens* (Forst.) R. Br.

GEN. CVII. PELTOPHORUS Desv.

Peltophorus elegans Beauv. 172. Name only.

GEN. CIX. AEGOPOGON Humb. & Bonpl.

Beauvois states that he unites *Amphipogon* R. Br. with *Aegopogon*, persuaded from Brown's description and from two species he possessed, that they can not be separated. "It is to be noted, however, that Brown says nothing of the lateral staminate or neuter spikelets * * *"

Aegopogon avenaceus Beauv. 122, 146, 150. Based on *Amphipogon avenaceus* R. Br. Valid in *Amphipogon*.

Aegopogon debilis Beauv. 122, 146, 150. Based on *Amphipogon debilis* R. Br. Valid in *Amphipogon*.

Aegopogon laguroides Beauv. 122, 146, 150. Based on *Amphipogon laguroides* R. Br. Valid in *Amphipogon*.

Aegopogon strictus Beauv. 122, 146, 150. Based on *Amphipogon strictus* R. Br. Valid in *Amphipogon*.

Aegopogon pusillus Beauv. 122. *pl. 22. f. 4.* The source of the specimen is not given. The illustration represents *A. cenchroides* Humb. & Bonpl., while plate 22, figure 3, named *A. cenchroides*, shows the broad glumes of *A. tenellus* (Cav.) Trin.=*A. cenchroides* Humb. & Bonpl.

GEN. CX. CHRYSURUS Pers.

Chysurus echinatus Beauv. 123, 158, 159. Based on *Cynosurus echinatus* L. Valid in *Cynosurus*.

Chrysurus effusus Beauv. 123, 158, 159. "*Cynosurus effusus* Lin." is referred to *Chrysurus;* presumably an error for Link=*Cynosurus elegans* var. *effusus* (Link) Aschers. & Graebn.

Chrysurus elegans Beauv. 123, 158, 159. Based on *Cynosurus elegans* Desf. Valid in *Cynosurus*.

Zizania lenticularis "Mich."; Beauv. 182. Name only, probably an error for *Leersia lenticularis* Michx. which is *Homalocenchrus lenticularis* (Michx.) Scribn.

DIPOGONIA Beauv. 125.

"Having for some time used the word *Diplopogon* in my méthode of the mosses, I am obliged to change it and not apply it to a genus of grasses." *Diplopogoni* is used as a section name,[244] not as a generic name; no species is combined with it=*Diplopogon* R. Br.

Dipogonia setacea Beauv. 125, 160. Based on *Diplopogon setaceus* R. Br. Valid in *Diplopogon*.

ANATHERUM Beauv. 128.

"Inflorescence paniculate; panicle subcompound, the branches simple, subverticillate, or culm branching, the inflorescence spicate; spikelets dissimilar,

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[244] Beauv. Prodr. Aetheog. 29. 1805.

2-flowered, one pedicellate, staminate or neuter, the pedicel naked or hairy, the other sessile, polygamous, the lower floret in each neuter; lower glume sometimes verrucose, muricate; lemma and palea membranaceous, hyaline, muticous."

Two species, *Anatherum muricatum* and *A. bicorne*, are illustrated. The description is drawn to cover both (the principal character being the want of an awn on the fertile lemma), but the characters of *A. muricatum* are given first, which seems to indicate that the author had that species chiefly in mind. For this reason Hitchcock and Chase[245] took *A. muricatum* as the type. But this seems to be a case where the well-known name of an economic species might be preserved by choosing for the type, of two species equally eligible, the one that will allow the better known name to be retained. If *A. bicorne* be taken as the type of *Anatherum* that becomes a synonym of *Andropogon*, leaving *Vetiveria* Thouars as the valid name of the widely cultivated vetiver or khus-khus grass used in perfumery. On reconsideration we therefore take *A. bicorne* as the type of *Anatherum*=*Andropogon* L.

Anatherum bicorne Beauv. 128, 150. *pl. 22. f. 11.* Based on *Andropogon bicornis* L. Valid in *Andropogon.*

Anatherum muricatum Beauv. 150. Atlas 15. *pl. 22. f. 10.* Based on *Andropogon muricatus* Retz. "*Panicum mucronatum* Lin." is cited under the genus (page 128), and "*Panicum muricatum* Lin." is referred (page 170) to *Anatherum.* Neither of these names is found in Linnaeus' work. They are presumably errors for *Andropogon muricatus*=*Vetiveria zizanioides* (L.) Nash.

Anatherum muticum Beauv. 128, 150. Based on *Andropogon muticus* L. Hackel[246] says this is probably a species of *Chloris*, possibly *C. petraea* Thunb.

Anatherum refractum Beauv. 128, 150. Based on *Andropogon refractus* R. Br.=*Cymbopogon refractus* (R. Br.) A. Camus.

Anatherum squarrosum Beauv. 128, 150. *Andropogon squarrosus* without author is cited under *Anatherum* (page 128), but "*Andropogon squarrosus* Lin." is referred (page 151) to *Anatherum muricatum. Andropogon squarrosum* L. f. (Suppl. 433. 1781) has commonly been held to be the same as *A. muricatus* Retz. Stapf[247] examined the specimen in the Linnaean Herbarium and identifies it as *Chamaeraphis spinescens* (R. Br.) Poir., calling attention to Brown's identification, also. [Brown[248] cites "*Andropogon squarrosum* Herb. Linn." as a synonym of his *Panicum abortivum*, which is the same as his *P. spinescens* or a closely related species.] The description by the younger Linnaeus "Flos hermaphroditus sessilis, masculi pedicellati" is misleading, as is the description of the first glume (the second is what is described, the first being overlooked), but otherwise the characters are those of *Chamaeraphis.* The spikelets in this species are appressed to a slender rachis, and the panicle has a superficial resemblance to species of *Rhaphis*= **Chamaeraphis squarrosa** (L. f.) Chase.

CALAMINA Beauv. 128.

"Culm branching; racemes numerous, each subtended by a leaflike spathe; 4 spikelets at the base of the raceme, staminate or neuter, verticillate; 2

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[245] Contr. U. S. Nat. Herb. **18**: 285. 1917.
[246] In DC. Monogr. Phan. **6**: 651. 1889.
[247] Kew Bull. Misc. Inf. **1906**: 348. 1906.
[248] Prodr. Fl. Nov. Holl. 193. 1810.

spikelets at the apex, one sessile, the other pedicellate, included in a setigerous, involucriform spathe, all 2-flowered; glumes longer than the florets; lower florets staminate, the upper perfect, the lemmas and paleas hyaline. * * * Obs. This is a natural genus. It approaches *Anthistiria* in having 4 neuter verticillate spikelets. It is differentiated by the absence of the awn and of the two staminate pedicellate spikelets."

Calamina gigantea, the species illustrated, is taken as the type. The figure represents *Apluda mutica* L.=*Apluda* L.

Calamina gigantea Beauv. 129, 151, 157. *pl. 23. f. 1. Anthistiria gigantea* Cav. is referred to *Calamina*, but the illustration, which represents *Apluda mutica*, and the note on absence of awns show that Beauvois misunderstood Cavanilles' species, which is *Themeda gigantea* (Cav.) Hack.

Calamina imberbis Beauv. 129, 151, 157. "*Anthistiria imberbis* Desf., Pers." is referred to *Calamina*. *A. imberbis* Desf. (as shown by the illustration)[249] is a misapplication of *A. imberbis* Retz. Desfontaines' plate represents *Themeda triandra* Forsk. See Stapf's discussion[250] of this name and its synonyms. Persoon[251] gives Retzius as author.

Calamina mutica Beauv. 129, 151, 157. Based on *Apluda mutica* L. Valid in *Apluda*.

Calamina sehima Beauv. 157, 178. Referred to *Schima* (page 157), while *Sehima* Forsk. (page 128) and *S. ischaemoides* Forsk. (page 178) are doubtfully referred to Calamina. *Sehima ischaemoides* Forsk. is referred to a variety of *Ischaemum laxum* R. Br. by Hackel.[252] *I. sehima* R. Br. is the earliest specific name under *Ischaemum*. *Sehima* is maintained as valid by Stapf.[253]

Calamina themeda Beauv. 157, 179. This is referred to *Themeda*, while *Themeda* Forsk. is listed as a doubtful synonym under *Calamina* (page 128) and, in another place (page 179), referred to *Calamina*, without query.

CYMBACHNE Retz.

Cymbachne alata Beauv. 159. Doubtfully identified with "*Rottboella cymbachne* Retz. Wild." Beauvois observes under "*Rottboella*" (page 109): "It would appear that the *Cymbachne* of Loureiro is only a species of *Rottboella*." Under *Cymbachne* (page 129) he observes, "Willdenow described a *Rottboella Cymbachne* which appears to be the same plant as the above [*Cymbachne* Retz.]. However, its characters remove it considerably from the genus *Rottboella*. It is to be verified." It is evident that Beauvois is guessing from descriptions only. *Cymbachne alata* seems to be published for *R. cymbachne*, in case it proves to be a species of *Cymbachne*. Hackel[254] refers *Cymbachne ciliaris* Retz. (the basis of the genus and of *Rottboellia cymbachne* Willd.) to *Andropogon cymbachne* (Willd.) Hack.

Gen. CXV. ANDROPOGON L.

Andropogon fastigiatus Lin.; Beauv. 132. Name only, error for *A. fastigiatus* Swartz. (See discussion under *Dicctomis*, page 206.)

Andropogon fuscatus Beauv. 131. Error for *furcatus* [Muhl.].

Andropogon radiatus R. Br.; Beauv. 131, 151. Name only.

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[249] Journ. de Phys. **40**: 293. *pl. 1*. 1792.

[250] In Prain. Fl. Trop. Afr. **9**: 418. 1919.

[251] Syn. Pl. **1**: 105. 1805.

[252] DC. Monogr. Phan. **6**: 245. 1889.

[253] In Prain, Fl. Trop. Afr. **9**: 37. 1917.

[254] DC. Monogr. Phan. **6**: 450. 1889.

GEN. CXVI. SORGHUM Pers.

Sorghum asperum Beauv. 131, 164, 178. *Holcus asper* without author is referred to *Sorghum*. Presumably Thunberg's species is intended; that is *Pentaschistis aspera* (Thunb.) Stapf.

Sorghum avenaceum Beauv. 131, 164, 178. Based on *Holcus avenaceus* Thunb. Nees [255] referred this to *Danthonia curvifolia* Schrad., which is the basis of *Pentaschistis curvifolia* (Schrad.) Stapf.

Sorghum capillare Beauv. 131, 164, 178. Based on *Holcus capillaris* Thunb. That is the basis of *Achneria capillaris* (Thunb.) Stapf. Bentham and Hooker [256] and Hackel [257] use "*Achneria* Munro non Beauv." for the South African species described by Nees under *Eriachne* R. Br., and are followed by Durand and Schinz [258] and by Stapf.[259] The species of *Eriachne* R. Br. (except for one in China) are confined to Oceanica. Beauvois proposed the anagram *Achneria* for Brown's awnless species (see page 181), true *Eriachne*. Nees [260] uses *Achneria* Beauv. as a subgeneric name under *Eriachne* R. Br. Munro [261] takes up *Achneria* Beauv., citing "Nees 273, sub *Eriachne*"; he does not propose a new genus. "*Achneria* Munro * * * non Beauv." is described by Bentham and Hooker (loc. cit.). The South African genus is without a valid name.

Sorghum caffrorum Beauv. 131, 164, 178. *Holcus caffrorum* without author is referred to *Sorghum*. *H. caffrorum* Thunb. is a form of *Holcus sorghum* L.

Sorghum commune Beauv. 131, 178. Name only, though from comparison (in Obs. page 132) of the spikelets with those of *S. halepense*, the cultivated *Holcus sorghum* seems to be indicated. *Holcus sorghum*, however, is referred to *Sorghum vulgare*.

Sorghum decolorans Beauv. 164, 178. *Holcus decolorans* without author is referred to *Sorghum*. On page 131 the name is spelled "*decolor*". *Holcus decolorans* Humb. & Bonpl.; Willd., described from Venezuela, is a form of *H. halepensis* L.

Sorghum elongatum Beauv. 131, 164, 178. Based on *Holcus elongatus* R. Br. This is the basis of *Chrysopogon elongatus* Benth.=**Rhaphis elongatus** (R. Br.) Chase.

Sorghum flavum Beauv. 131, 178. Name only; probably meant for *fulvum*, *Holcus fulvus* R. Br. being referred (page 164) to *Sorghum*.

Sorghum pallidum Beauv. 131, 165, 178. Based on *Holcus pallidus* R. Br. A form of *Rhaphis gryllus* (L.) Desv.

Sorghum parviflorum Beauv. 132, 165, 178. Based on *Holcus parviflorus* R. Br. This is the basis of *Andropogon micranthus* Kunth and the type species of the genus *Capillipedium* Stapf=**Rhaphis parviflora** (R. Br.) Chase.

Sorghum plumosum Beauv. 132, 165, 178. Based on *Holcus plumosus* R. Br. This is the basis of *Andropogon australis* Spreng. (not *A. plumosus* H. B. K.). Valid in *Holcus*.

Sorghum rubens Gaertn.; Beauv. 178. Based on *Holcus rubens* Gaertn. A form of *Holcus sorghum* L.

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[255] Fl. Afr. Austr. 322. 1841.
[256] Gen. Pl. 3: 1158. 1883.
[257] In Engler & Prantl, Pflanzenfam. 2²: 54. 1887.
[258] Consp. Fl. Afr. 5: 836. 1894.
[259] In Thiselt. Dyer, Fl. Cap. 7: 456. 1898.
[260] Fl. Afr. Austr. 273. 1841.
[261] In Harvey, Gen. Pl. Cap. ed. 2. 449. 1868.

Sorghum saccharatum Mieg; Beauv. 165, 178. "*Holcus saccharatus* Wigg., Pers." (page 165) is referred to *Sorghum*. Persoon[262] uses *Holcus* for *H. lanatus* and *H. mollis* only, not for the sorghums. Under *Sorghum* (page 101) is *S. saccharatum* with a doubtful reference to an illustration by Mieg. The quotation of part of Linnaeus' description of *Holcus saccharatus* credited to "Lin." identifies the species=*Holcus sorghum saccharatus* (L.) Bailey.

Sorghum spicatum Beauv. 178. Name only, referred to *Penicillaria*. Evidently an error for *Holcus spicatus* L., which is *Pennisetum glaucum* (L.) R. Br.[263]

Sorghum striatum Beauv. 132, 165. *Holcus striatus* without author is referred to *Sorghum*. Doubtless Linnaeus' species is intended. That is *Sacciolepis striata* (L.) Nash.

Sorghum strictum Beauv. 178. Probably error for *S. striatum*. See above.

GEN. CXVII. **DIECTOMIS** Beauv. 132.

"Culm branching; inflorescence paniculate, the panicles subcompound; spikelets in pairs, 2-flowered, dissimilar, one sessile with polygamous florets, the other pedicellate with staminate florets, the glumes herbaceous, longer than the florets, the lower tridentate at the apex, the lemma and palea membranaceous, the lemma subbifid; lower floret of polygamous spikelet staminate, the upper perfect; lower glume with an obtuse unguiculate apex, the upper tridentate; lemma and palea membranaceous; lemma of the perfect floret rudimentary, awned; awn very long, plicate, twisted."

In the index (page 160) "Humb. et Bonpl., Wild." are given as authors of *Diectomis*. This name is not found in Willdenow's works,[264] Beauvois must have seen the name in manuscript. *Diectomis fastigiata* is the only species included. *Andropogon fastigiatus* Swartz is referred to *Diectomis*. ("Lin." is given as author on page 132.) But the generic description and illustration (plate 23, figure 5) do not at all agree with *Andropogon fastigiatus* Swartz. The illustration was evidently drawn from a specimen of *Apluda aristata* L., though it (and the description) are inaccurate in some points. The summit of the first glume is shown as a striate structure with entire margin. This is obviously meant for the greenish, herbaceous, nerved tip characteristic of *A. aristata* which, however, is minutely 2-toothed. The fertile lemma described as "subnulla" is well developed but deeply cleft and is so shown in the figure. In the displayed spikelet the staminate floret is shown above the second glume instead of above the first, and the fertile floret is in the axil of the sterile lemma. Kunth[265] suggests that Beauvois' illustrator confused a specimen Beauvois had from the herbarium of Humboldt and Bonpland with a fragment of some other grass. That would appear to be the case, and Beauvois evidently drew up his description from the drawing. The description and illustration being identifiable as *Apluda aristata*, *Diectomis* Beauv. is really a synonym of *Apluda*, though Beauvois apparently supposed his plant to be *Andropogon fastigiatus* Swartz. In the Delessert Herbarium is

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[262] Syn. Pl. 1: 78. 1805.

[263] See Chase, Amer. Journ. Bot. 8: 41. 1921.

[264] Hackel (DC. Monogr. Phan. 6: 392. 1889) cites "*Diectomis* (genus) Humb. et Bonpl. ap. Willd. Spec. 4, p. 741." This is an error, page 741, volume 4 having no grass genera. *Andropogon fastigiatus* (the type species of *Diectomis* H. B. K.) is found on page 913, but the name *Diectomis* does not appear.

[265] Mém. Mus. Hist. Nat. 2: 70. 1815.

a fragment of *Andropogon fastigiatus* Swartz marked "*Diectomis fastigiata*, Humboldt & Bonpl. sp. pl. amer." in an unknown script, and "*Andropogon fastigiatus* Swartz" in Beauvois' script. Hackel[266] cites *Diectomis fasciculata* Beauv. (the name as given in the Atlas) plate 23, figure 6, under *Andropogon leptocomus* Trin., referring to a correction in a supplementary "erratorum." Such correction is not made in the Errata in our copy of the Agrostographie, nor in Beauvois' own annotated copy which is now in the library of the United States Department of Agriculture. But there must have been a later printing of the work, for in Hackel's copy, now in the Rijks Herbarium of Leiden, the "Errata" is followed by a "Supplément a l'Errata" which reads as follows [translated]: "Page 132. Gen. CXVII. For *Diectomis*, read *Apluda*, and transfer the species to the genus following; also on page 133, line 3, in place of 'lower terminated' read 'lower not terminated.' [The observation reads: "This genus, *Diectomis*, improperly placed in *Andropogon*, approaches *Apluda*, from which it differs essentially in that the lower glume is terminated by an impression in the form of a nail (or claw). Fresh material should be examined."]

"Page 133. Gen. CXVIII. For *Apluda*, read *Diectomis* Wild. mss., and transfer the species to the preceding genus. Make the same transposition of the names in the explanation of the figures, *pl. 23, fig. 5 and 6.*" This transposing of names does not rectify the errors. The description of *Diectomis*, even with the "unguiculate apex" of the first glume eliminated, applies to figure 5, not to figure 6, and that of *Apluda* applies to figure 6, not to figure 5. Neither is *Andropogon fastigiatus* Swartz nor *Andropogon gryllus* L., as Beauvois supposed. (See *Apluda*, below.)

We are indebted to Dr. J. Th. Henrard of Leiden for a transcript of the Supplémenta l' Errata. He states that this is found also in the copy in the library of the University of Leiden. Copies containing this supplement must be of later date than copies without it. This supplement would not then affect the typification of the genus, especially since the descriptions are left uncorrected. *Diectomis* Beauv. is such a complex of errors that it should not be allowed to invalidate *Diectomis* H. B. K. (1816) based on *Andropogon fastigiatus* Swartz, but should be rejected as not properly published.

Diectomis fasciculata Beauv. Atlas 15. *pl. 23. f. 5.* Error for *fastigiata.*

Diectomis fastigiata Beauv. 132, 150, 160. *pl. 23. f. 5=Apluda aristata* L. (See above; also *Apluda* below.)

GEN. CXVIII. APLUDA L.

Apluda distachya Beauv. 133, 150, 151. Based on *Andropogon distachyon* L. [spelled *distachyos*]. Valid in *Andropogon.*

Apluda gryllus Beauv. 133, 150, 151. *pl. 23. f. 6. Andropogon gryllus* L. is referred to *Apluda* but the illustration does not represent that species. Stapf[267] suggests that figure 6 represents *Andropogon leptocomus* Trin. (*Anadelphia leptocoma* (Trin.) Stapf) or an allied species. Comparison with this species confirms this identification. (See discussion under *Diectomis*, above.)

GEN. CIX. ANTHISTIRIA L.

Anthistiria villosa Beauv. 134, 151. Name only.

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[266] DC. Monogr. Phan. 6: 396. 1889.

[267] In Prain, Fl. Trop. Afr. 7: 391. 1919

Heteropogon hirsutis Beauv. 134 [error for *hirtus* Pers.]

LITHACHNE Beauv. 135.

"Culm branching; inflorescence spicate; spikes simple, dissimilar, one terminal with 1-flowered staminate spikelets, the glumes wanting, the lemma and palea acuminate, the other axillary with 1-flowered pistillate spikelets, the glumes herbaceous, acuminate; lemma and palea coriaceous-indurate, the lemma truncate, keeled, gibbous."

Olyra pauciflora, the only species cited under the description, is the type. Genus valid.

Lithachne axillaris Beauv. 166. *pl. 24. f. 2.* This is the same as *Olyra axillaris* Lam., but no reference to Lamarck is given=*Lithachne pauciflora* (Lam.) Beauv.

Olyra pauciflora Swartz is referred (page 168) to *Lithachne*, but the specific name is not transferred, *axillaris* evidently being the preferred name= *Lithachne pauciflora* (Lam.) Beauv.; Poir.

HYDROCHLOA Beauv. 135.

"Culm branching; inflorescence spicate; spikes simple, dissimilar, one terminal, with 1-flowered staminate spikelets, the glumes wanting, the stamens 6, the other axillary, with 1-flowered pistillate spikelets, the glumes wanting, the lemma and palea herbaceous."

Hydrochloa caroliniensis is the only species. Genus valid.

Hydrochloa caroliniensis Beauv. 165. *pl. 3. f. 18; pl. 24. f. 4.* (Spelled *caroliniana* on page 3 of Atlas.) "*Zizania natans* Mich." is cited under the genus, and *Z. fluitans* Michx. is referred in the index to *Hydrochloa*. *Zizania natans* Bosc was later published by Trinius as a synonym of *Hydrochloa caroliniensis* Beauv. Beauvois probably saw this name in some herbarium. *Zizania fluitans* Michx. is evidently the basis of *Hydrochloa caroliniensis* Beauv. Valid, *fluitans* now being preoccupied by *H. fluitans* Hartm. 1819.

GEN. CXXV. GYNERIUM Humb. & Bonpl.

Gynerium procerum Beauv. 164. *pl. 24. f. 6.* Presumably a change of name for *G. sagittatum* [Humb. & Bonpl.] which is cited under the genus but not given in the index. The generic description begins "* * * Culmus procerus."

GRAMINA OF UNCERTAIN POSITION.

NASTUS Juss.

Nastus verticillatus Beauv. 168. Name only. "*Bambos* Wild." is cited under *Nastus* (page 141). Willdenow[268] cites *Nastus* Juss. under *Bambusa arundinacea* Willd. A second species is *B. verticillata* Willd.; possibly this is the basis of *N. verticillatus*. Beauvois gives an illustration (plate 25, figure 3) which in the explanation is named "*Nastus*" only. This represents a species of *Bambos* Retz.

DIARRHENA [Raf.]

"*Diarrhena* Smart." is cited (page 42) and "*Diarrhena* Shmal" is given in the index. Rafinesque-Schmaltz is the author referred to.

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[268] Sp. Pl. 2: 245. 1799.

Diarrhena americana Beauv. 142. *pl. 25. f. 2.* "*Festucae* spec. Rich. in Mich." The last species of *Festuca* in the work referred to is *F. diandra* Michx.[269] (not Moench 1794), which is the species upon which Rafinesque based the genus *Diarina*. The illustration represents this species, for which *D. americana* is a change of name=*Diarina festucoides* Raf.

PSAMMA Beauv. 143.

"Inflorescence spicate; spike compound, erect, cylindrical; glumes submuticous, longer than the emarginate mucronate lemma and palea."

The only species cited under the genus is "*Arundo littoralis*"=*Ammophila* Host.

Psamma littoralis Beauv. 144, 176. *pl. 6. f. 1.* The illustration is recognizable as *Ammophila arenaria* (L.) Link, though the palea is erroneously shown with a minute awn just below the tip as in the lemma. The same error is found in the description.

ARUNDINARIA Michx.

Arundinaria glaucescens Beauv. 144, 152. Based on *Ludolfia glaucescens* Willd. Referred by Munro, Gamble, and others to *Bambusa* [*Bambos*] *nana* Roxb.

STEMMATOSPERMUM Beauv. 144.

"Inflorescence paniculate; panicle subsimple; spikelets sessile, many-flowered, the lower floret neuter, the palea wanting, the upper perfect, with a pedicellate capitate rudiment beyond the uppermost; glumes subcoriaceous, shorter than the florets; lemma subtridentate; palea entire."

Stemmatospermum verticillatum is the only species=*Nastus* Juss.; Gmel.

Stemmatospermum verticillatum Beauv. 145. *pl. 25. f. 5.* The illustration, emphasizing the indurate tips of the lemmas, represents *Nastus borbonicus* J. F. Gmel. The source of the specimen is not given.

In the index are the following new names which are not included under any of the genera enumerated in the text.

Cembul Moris.; Beauv. 157. Name only, referred to *Campulosus.* Morison[270] says that *Cembul* of the Arabs is *Nardus spica* and *Cembul* of India is *Nardus spica indica.* These names were used for *Cymbopogon schoenanthus* (L.) Spreng. Beauvois' identification is probably due to Morison's figure (Sect. 8, Tab. 13) of another *Nardus* which represents a species of *Campulosus.*

Dylepyrum [Dilepyrum] diffusum Beauv. 160. Name only, referred to *Muhlenbergia.* Probably an error for *Muhlenbergia diffusa* Willd., which is the same as *M. schreberi* Gmel.

Dylepyrum [Dilepyrum] multiflorum Beauv. 160. Name only, referred to *Muhlenbergia.*

Kerpa "Hort. Mal."; Beauv. 166, referred to *Imperata cylindrica.* This name is found in Hortus Malabaricus[271] on an illustration which was probably drawn from *Saccharum arundinaceum* Retz.

Sanguinella thunbergii Beauv. 177. Name only, referred to *Digitaria.*

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[269] Michx Fl. Bor. Amer. 1: 67. 1803.

[270] Pl. Hist. 3: 256. 1699.

[271] Rheede, Hort. Malabar. 12: 85. *pl. 46.* 1703.

Sanguinella tripsacoides Beauv. 177. Name only, referred to *Rottboellia compressa.*

Tremula Scheuch.; Beauv. 179. Referred to *Briza.* There is no specific name. *Gramina tremula* in Scheuchzer (Agrost. 202. 1719) is *Briza maxima* L.

Sparteum Clus.; Beauv. 178. A pre-Linnaean name for *Stipa pennata* L.

Sparteum austriacum Beauv. 178. Name only, referred to *Stipa pennata* L.

LIST OF NEW NAMES.

Chaetochloa longiseta (Beauv.) Chase.
Setaria longiseta Beauv 173
Chamaeraphis squarrosa (L. f.) Chase.
Andropogon squarrosus L. f 203
Desmazeria uniolae (L. f.) Chase.
Cynosurus uniolae L. f 177
Paspalum ceresia (Kuntze) Chase.
Panicum ceresia Kuntze 153
Rhaphis elongatus (R. Br.) Chase.
Holcus elongatus R. Br 205
Rhaphis parviflora (R. Br.) Chase.
Holcus parviflorus (R. Br.) 205
Schismus barbatus (L.) Chase.
Festuca barbata L 182
Syntherisma gibbosa (R. Br.) Chase.
Panicum gibbosum R. Br 171

BIOGRAPHICAL SKETCH.[272]

Ambroise Marie François Joseph Palisot, baron de Beauvois, was born at Arras, Province of Artois (now Pas-de-Calais), France, October 28, 1755. After having served a short time in the Mousquetaires, Beauvois studied law until the death of his father and elder brother conferred on him the office of receiver general for Picardie, Flanders, and Artois, hereditary in his family. This office paid well and did not require much time, so the young man devoted his leisure to study under Lestiboudois, professor of natural history at Lille, and became an enthusiastic collector of plants and insects. When he was 22 an edict of the king abolished the receivers general and Beauvois returned to private life. He went to Paris and became a follower of Jussieu, soon distinguishing himself among the younger botanists, presenting many papers on botanical subjects, especially on mushrooms and mosses, to the Academy of Sciences. He must have had a winning personality, for he seems to have had warm friends and admirers among those who knew him, and was honored by election to the Academy of Sciences of the Royal Institute.

Beauvois delighted in reading the accounts of voyagers and became eager to travel himself. He wished to carry on the exploration

[272] Sources: Cuvier's Eloge delivered before the Institut de France, March 27, 1820; Jussieu's introductory note in the Flore d'Oware et Benin, and Laségue's Musée botanique de B. Delessert.

planned by the Danish naturalist Forskål and ended by his untimely death. Beauvois planned after reaching the Red Sea to cross Africa from Egypt to Senegal or Guinea. At first he received some encouragement from the Government, but nothing came of it. In 1786, however, he found a way to go to west Africa. A negro sea captain, Landolphe, carrying on trade for a French commercial house, interested the native king of Awerri (in the delta of the Niger River) in the project of securing a French trading station. The king sent his adopted son and heir to France to be educated. The youth, Boudakau, was well received and was presented to Louis XVI. The opportunity for trade and profit was so glowingly presented by Captain Landolphe that authorization from the French Government was obtained to form a company of merchants, who furnished the funds for the enterprise. The captain had met Beauvois and also Jussieu. He asked the latter to recommend an able gardener to direct the projected plantations. Beauvois, eager to visit a region wholly unknown to botanists, offered himself for the post, hoping that after becoming established on the coast of Africa he might later realize his dream of crossing the continent. He seems to have had little intention of entering the service of the company and he provided himself with books, instruments, and provisions at his own expense. Fired by his enthusiasm his brother-in-law joined him in the venture. They sailed July 17, 1786. Beauvois expected to be gone about 4 years, but it was 12 years before he returned to France. The little fleet made many stops on the way south and at each point Beauvois collected plants and seeds which he sent to Jussieu by the ships which they encountered. The fleet reached its destination November 17, 1786, and the adventurers were most kindly received by the natives. But the poor colonists suffered tortures from the heat and humidity, the insects, and rats, which the natives took as matters of course. Yellow fever broke out among the Europeans. Of the 300 French who had gone to Africa 250 died during the five months they remained at Oware (or Awerri), among the victims being Beauvois' brother-in-law and two servants he had brought from France. In spite of his own ill health Beauvois explored Oware, part of Calabar (the coast region to the west), and Benin, where he remained for some time. His extensive collections of plants and insects he sent to Jussieu to hold until his return to Europe. Finally, after 15 months, his health became so critical that he was placed on board a "Negro vessel" (apparently a slave ship) bound for Saint Dominique (now Santo Domingo), then a French possession. He reached there June 28, 1788, after three and one-half months' voyage, in a very weak condition. He gradually recovered and then explored the

country with great ardor. But this far-off possession soon felt the tremor of the approaching French Revolution. The revolt of the negroes and the attempt to suppress it on the part of the whites made travel dangerous, but Beauvois, nevertheless, continued his explorations, collecting plants and sending seeds to France. He was made a member of the council general of the colony and had to interrupt his botanical work to take part in the discussions of that body, and, as the revolt spread, to command various detachments sent against the negroes. The revolt filled other slave-holding regions with fear and deputations were sent to Martinique, Jamaica, and the United States to implore aid. Beauvois was sent on this mission to Philadelphia in October, 1791. He made use of the time afforded by diplomatic delays to botanize in the region about Philadelphia and southward. In the meantime the negroes were gaining ground in Saint Dominique and after a year and a half Beauvois was recalled. He reached the island in June, 1793, just after the burning of Cape Français, to find his house in ruins and the collections of his three years in the island utterly destroyed. He was imprisoned but at the intercession of a kindly mulatto was released and ordered to leave the country. He set sail with the possessions he had taken back with him from the United States, but the ship was captured by the British and everything seized except one small trunk. With this and ten francs in money he reached Philadelphia. He could get no help from France, for the monarchy had been overthrown and Beauvois learned that his name was on the list of emigrés forbidden to return to France. He made a living by teaching music and French. The Quaker physician, Caspar Wistar, received the exile into his house. Later Peale employed him to arrange the collections in his museum. With his slender earnings and some help from the new French minister he continued his explorations, going as far as eastern Tennessee, collecting plants, seeds, animals, and fossils. According to Cuvier it was Beauvois who sent the teeth of Megalonyx to Jefferson. From time to time Beauvois sent his collections to the Paris Museum, some of the shipments reaching there safely and some being lost. After some years his friends in France succeeded in having his name removed from the list of emigrés and he was informed that his property had been restored and that he might return and enjoy the status of a French citizen under the new constitution. He abandoned a projected journey to Arkansas, assembled what remained of his collections, and sailed for home, landing in Bordeaux in August, 1798.

Again in Paris, Beauvois seems to have taken an active part in scientific circles, where his collections of plants, of insects and other animals, as well as of minerals, had made him well known. He pre-

sented numerous papers before the Academy and began work on his collections of plants and insects. The first fascicles of his Flore Oware et Benin were published in 1804, and the work continued to appear at intervals until 1820. His work on the insects collected by him in Africa, Saint Dominique, and America appeared in 12 parts between 1805 and 1820. Beauvois seems to have adjusted himself to the new régime. His Flore Oware and his Insectes were issued in sumptuous form under the patronage of the Government, and one of his new African plants he named *Napoleana imperialis*.

During his earlier years in Paris Beauvois had been interested in cryptogams, which he designated *Aethogamie* (unusual marriage) instead of *Cryptogamia* (hidden marriage), the term coined by Linnaeus for them. Beauvois seems to have been confident that all plants had stamens and pistils; Linnaeus' statement that in the *Cryptogamia* the flowering is not visible to the naked eye was a challenge to him to discover it. As the result of his "researches" he thought that he found the pollen, the stigmas, and grain in polyporous and gill-fungi. His explanation of the fructification of the puffballs is especially ingenious. The powder in the puffballs, which botanists had taken for the seed, is combustible and floats on water and is, therefore, to be regarded as pollen. The seed was contained in a deeper recess and issued through the same opening as the pollen and at the same time, being fertilized in the passage. This was analogous to the fertilization of the eggs of the frog at the time they were laid. On his return to Paris he found that Hedwig had been publishing works on the mosses and their fructification that did not at all accord with his own ideas. In 1805 he published[273] the "result of many years of research" which he "hastened to offer to the public" because of the differences between his system and that of Hedwig.

Beauvois' interpretation of the organs of mosses and his ideas of their fructifications are as ingenious as his explanations concerning the mushrooms, and display an unscientific type of mind that felt no need of verification by experiment or repeated observations. Then he leaves it to botanists to decide whether his explanations "are not more natural and more probable" than the statements of Hedwig (who had germinated the "green powder," which Beauvois maintained was pollen, and obtained moss plants). These ideas of Beauvois do not appear to have been accepted by the botanists of his acquaintance, which would account for the author's repeated appeal to the judgment of "impartial botanists."

Of the history of his attempt to work out a new classification for the grasses we know nothing except what he tells in the Advertise-

[273] Prodr. cinquième et sixième familles de l'Aethéogamie.

ment and Introduction to the Essay. The morphology of the grasses fared better at his hands than did that of the cryptogams, but the nomenclature suffered far more.

Beauvois died in Paris, January 21, 1820, leaving no children.

Beauvois' own copy of his Essay is now in the library of the United States Department of Agriculture. It is inscribed [translated] "Copy corrected by the hand of the author and given, after his death, to M. Thém. Lestiboudois by Mme. Palisot de Beauvois. [Signed] Thém. Lestiboudois." In this is a manuscript Tabula Methodique, using different characters from those in the original table, bringing the genera into less unnatural groups. Group names are suggested as: "Les Saccharées: *Imperata*, *Saccharum*, *Trichoon* [*Phragmites*], *Erianthus*, *Dimeria*." In the book (p. 5) *Agraulus* and *Trichodium* are crossed out, the first annotated "réunie a l'*Agrostis*," the second "réunie au *Vilfa*." Under *Axonopus* (p. 12) "*paniceum*" is crossed out. *Heleochloa* (p. 23) is marked "réunie au *Crypsis*," and *Bouteloua* (p. 40) "réunie au *Chondrosium*." Under *Setaria* (p. 51) "*Setaria longiseta* nob. fl. Ow." is added. *Molinia* (p. 68) and *Orthoclada* (p. 69) are referred to *Poa; Schismus* (p. 73) to *Triodia; Diplachne* (p. 80) to *Schedonorus; Lodicularia* (p. 108) to *Rottboell*[*i*]*a; Zeocriton* (p. 114) to *Hordeum;* and *Lithachne* (p. 135) to *Olyra*. *Remirea* and *Diaphora* (p. 143) are each marked "c'est une cypérée." There are changes in a number of the generic descriptions, but none in *Anthaenantia*, *Ichnanthus*, *Diectomis*, *Apluda*, or other genera obviously incorrectly described. The index is full of changes and additions. We can not give these here, because to do so would publish many new names. There is nothing, except the manuscript Tabula Methodique, that indicates a serious revision of the work.

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UNITED STATES NATIONAL HERBARIUM

VOLUME 24, PART 7

THE NORTH AMERICAN SPECIES OF STIPA

SYNOPSIS OF THE SOUTH AMERICAN SPECIES OF STIPA

By A. S. HITCHCOCK

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II

PREFACE.

As a result of his work on American grasses, Prof. A. S. Hitchcock, botanist in charge of systematic agrostology, United States Department of Agriculture, has prepared the two accompanying papers upon *Stipa*, one of the larger genera of the grass family. The species of this genus are found throughout the temperate regions of the world and are especially characteristic of steppes, plains, deserts, and other arid and semiarid regions. They form an important part of the forage of the western plains and foothills of the United States. The first paper is a revision of the North American species, of which there are 40. Five of these are described as new.

The second paper is a synopsis of the South American species of *Stipa* represented in the United States National Herbarium. Unfortunately the material at hand is not sufficient to warrant a complete revision at this time. There are included 89 species, 19 of which are described as new.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

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Figs. 8, 9. *Stipa leiantha;* Mexico, *Hitchcock* 6489.
Figs. 10, 11. *Stipa pringlei;* Mexico, *Hitchcock* 7681.
Figs. 12, 13. *Stipa eminens;* Mexico, *Palmer* 523.
Figs. 14, 15. *Stipa clandestina;* Mexico, *Arsène* 3441.
Figs. 16, 17. *Stipa lepida;* California, *Chase* 5609.
Figs. 18, 19. *Stipa porteri;* Colorado, *Wolfe* 1109.
Figs. 20, 21. *Stipa thurberiana;* Idaho, *Chase* 4689.
Figs. 22, 23. *Stipa elmeri;* California, *Hitchcock* 3336.
Figs. 24, 25. *Stipa occidentalis;* Oregon, *Hitchcock* 11740.
Figs. 26, 27. *Stipa multinodis;* Mexico, *Pringle* 385.
Figs. 28, 29. *Stipa constricta;* Mexico, *Hitchcock* 6742.
Figs. 30, 31. *Stipa scribneri;* New Mexico, *Vasey.*
Figs. 32, 33. *Stipa californica;* California, *Hall* 2556.

PLATE 52. Fruits of *Stipa* ---------- 262

Figs. 1, 2. *Stipa angustifolia;* Mexico, *Palmer* 726.
Figs. 3, 4. *Stipa virescens;* Mexico, *Hitchcock* 5973.
Figs. 5, 6. *Stipa mexicana;* Mexico, *Pringle* 4299.
Figs. 7, 8. *Stipa lemmoni;* California, *Butler* 830.
Figs. 9, 10. *Stipa williamsii;* Wyoming, *Williams* 2804.
Figs. 11, 12. *Stipa viridula;* South Dakota, *Griffiths* 201.
Figs. 13, 14. *Stipa vaseyi;* New Mexico, *Hitchcock* 13280.
Figs. 15, 16. *Stipa columbiana;* Montana, *Hitchcock* 4911.
Fig. 17. *Stipa columbiana nelsoni;* Wyoming, *Nelson* 3963.
Figs. 18, 19. *Stipa lettermani;* Idaho, *Letterman* 102.
Figs. 20, 21. *Stipa pinetorum;* Colorado, *Jones* 6023.
Figs. 22, 23. *Stipa arida;* Utah, *Jones* 5377.
Figs. 24, 25. *Stipa editorum;* Mexico, *Hitchcock* 6469.
Figs. 26, 27. *Stipa tenuissima;* New Mexico, *Hitchcock* 13498.
Figs. 28, 29. *Stipa ichu;* Mexico, *Hitchcock* 6521.

THE NORTH AMERICAN SPECIES OF STIPA.

By A. S. Hitchcock.

INTRODUCTION.

The genus *Stipa* was established by Linnaeus in the Species Plantarum, being based upon three species, two from Europe, *S. pennata* and *S. juncea,* and one from Virginia, *S. avenacea.* A fourth species, *S. membranacea,* was added in the addenda. The genus is well marked and the generic concept has not been changed materially, the three original species being still retained in the genus. In the original description of the genus [1] Linnaeus distinguished the group by the articulation of the awn with the summit of the lemma, the awn being sometimes bent and sometimes straight.

The name *Stipa* was coined by Linnaeus. He makes no statement as to the origin of the word, but it is assumed to come from the Greek, *στύπη,* meaning tow, probably referring to the feathery appearance of the awns of *S. pennata.* Ascherson [2] writes the word *Stupa* and Doell [3] writes it *Stypa.*

The species of *Stipa* form an appreciable or even important part of the forage in our Western States. Their forage value is greatest during the early part of the season, and decreases rapidly toward maturity as the leaves and stems become woody and fibrous. The species that produce robust sharp-pointed fruits, such as *S. comata, S. leucotricha,* and *S. spartea,* may become injurious to stock at maturity.

One species, *S. vaseyi,* called sleepy grass, has the reputation of being toxic and is said to produce narcotic effects upon grazing animals, especially horses.

Stipa tenacissima L., of Spain and Algeria, furnishes a part of the esparto or alfa of commerce, used in the manufacture of paper and cordage.

The American species of *Stipa* are commonly known as speargrasses, to distinguish them from the needlegrasses belonging to the allied genus *Aristida.* Some of our species, especially those with robust awns are called porcupine-grasses, and one, *S. comata,* because of the long slender flexuous awns, is known in the West as needle-and-thread grass.

The illustrations, by the author, show the mature floret at natural size and the body of the lemma enlarged 5 diameters.

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[1] Gen. Pl. ed. 5. 34. 1754.
[2] Fl. Brand. 1: 812. 1864.
[3] Rhein. Fl. 106. 1843.

33633—25†——2

DESCRIPTION OF THE GENUS AND SPECIES.

STIPA L.

Stipa L. Sp. Pl. 78. 1753. Linneaus describes three species, *S. pennata* and *S. juncea*, from Europe, and *S. avenacea*, from Virginia. *Stipa pennata*, being the commoner of the European species, is selected as the type. The plumose awn may have suggested the generic name.

Trichosathera Ehrh. Beitr. Naturk. 4: 149. 1789. A name given in Ehrhart's Phytophylacium to *Stipa capillata* L. The name was misspelled *Trichosantha* by Steudel.[4]

Jarava Ruiz & Pav. Fl. Peruv. Chil. 1: 5. *pl. 6. f. b.* 1798. Based on *Jarava ichu* Ruiz & Pav. The data of publication of *Jarava* is discussed on page 259. Steudel[5] spells the name *Jarapha* and lists *J. arundinacea* Willd., *J. ichu* R. P., and *J. usitata* Pers.

Achnatherum Beauv. Ess. Agrost. 19. *pl. 6. f. 7.* 1812. The figured species is *Stipa calamagrostis* (L.) Wahl.

Podopogon Raf. Neogen. 4. 1825. The genus is briefly described and two species mentioned, *Stipa avenacea* and *S. barbata* (same as *S. avenacea*). The genus is again described as if new in 1830,[6] and the same two species mentioned.

Lasiagrostis Link, Hort. Berol. 1: 99. 1827. Includes one species, *L. calamagrostis*, based on *Stipa calamagrostis* Wahl.

Macrochloa Kunth, Rév. Gram. 1: 58. 1829. Includes two species, *M. tenacissima*, based on *Stipa tenacissima* L., and *M. arenaria*, based on *S. arenaria* Brot. The first may be regarded as the type.

Aristella Bertol. Fl. Ital. 1: 690. 1833. Includes one species, *A. bromoides*, which is the same as *Stipa aristella* L. This was first used as a section of *Stipa* by Trinius.[7]

Orthoraphium Nees, Proc. Linn. Soc. 1: 94. Feb. 1841; Nees, Ann. Mag. Nat. Hist. 7: 221. May, 1841. Includes only one species, *O. roylei* Nees. (*Stipa roylei* Mez). In this the body of the lemma exceeds the very unequal glumes, the callus is blunt, the lemma not convolute below, the palea visible at the base; the articulation with the awn is very obscure and marked by a few stiff reflexed hairs; the awn is flexuous, with a few loose twists.

Ptilagrostis Griseb. in Ledeb. Fl. Ross. 4: 447. 1853. Includes only one species, *P. mongholica*, based on *Stipa mongholica* Turcz.

Trinius[8] divides *Stipa* into four sections: section 1, *Oreostipa*, with naked awns; section 2, *Jarava*, with plumose awns; section 3, *Neostipa*, with unequal glumes, from Australia; section 4, *Schizachne*, with subulate glumes, from South Africa; section 5, *Eustipa*, with long awns, from the North Temperate regions. He holds distinct *Aristella*, *Orthoraphium* and *Lasiagrostis*.

DESCRIPTION.

Spikelets 1-flowered, disarticulating above the glumes, the articulation oblique, leaving a barbed sharp-pointed callus attached to the base of the floret; glumes membranaceous, often papery or hyaline, acute, acuminate, or even aristate, usually long and narrow, equal or slightly unequal; lemma narrow, terete, oblong to linear or fusiform, indurate at maturity, strongly convolute, terminating in a persistent or more or less deciduous, usually twisted and twice geniculate awn, a distinct line of demarcation between awn and body of lemma; palea inclosed in the lemma.

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[4] Nom. Bot. ed. 2. 2: 702. 1841.
[5] Nom. Bot. ed. 2. 1: 797. 1840.
[6] Bull. Bot. Seringe 1: 221. 1830.
[7] Fund. Agrost. 110. 1820.
[8] Mém. Acad. St. Pétersb. VI. Sci. Nat. 5[1]: 26–82. 1843.

Cespitose perennial grasses, with usually convolute blades and narrow or sometimes open panicles. Species about 250 in the temperate regions of the world, especially on plains and steppes.

In America the genus extends from Canada south through the Mexican plateau, but is nearly absent from Central America. It reappears in the Andes of Colombia, and is represented by numerous species in the southern part of South America.

In the type species, *S. pennata*, the terminal segment of the elongate twice-geniculate awn is beautifully plumose. To the group including this species belongs our *S. neomexicana*.

Stipa speciosa, with a once-geniculate awn strongly plumose below the bend, has several allies in southern South America.

In Australia[9] there is a group in which the apex of the lemma is 2-lobed with the awn from between the lobes. One of our species, *S. stillmanii*, possesses a strongly lobed lemma, but does not seem to be allied closely to the Australian group. In a few other species (for example, *S. scribneri* and *S. pinetorum*) the lemma may develop minute lobes. In *S. porteri* the lobes are rather broad, firm, and acutish, but not long-acuminate as in the others.

The awn in most of the species is persistent, but in a few species is readily or tardily deciduous, thus approaching *Oryzopsis*, which has a shorter and more turgid lemma and scarcely twisted deciduous awn.

Stipa, *Oryzopsis*, *Nassella*, and *Piptochaetium* form a well-marked group, which together with *Aristida*, *Ortachne* and *Streptachne* compose the subtribe *Stipeae* of the tribe *Agrostideae*. *Aristida* is distinguished by its trifid, usually unarticulated awn (the lateral awns obsolete in a few species). *Oryzopsis*, *Nassella*, and *Piptochaetium* have broad lemmas and deciduous awns; *Stipa*, *Ortachne*, and *Streptachne* have persistent awns and narrow lemmas. *Stipa* is distinguished from the other two by the more indurate lemma, the awn usually tightly twisted below, and usually by a needle-like callus.

Our species are all perennials, but in the Old World there are a few annual species, such as *S. tortilis* Desf., *S. compressa* R. Br., and *S. lachnoclea* Hughes, and in South America there is one annual, *S. annua* Mez.

The awns are usually hygroscopic, twisting and untwisting with varying amounts of moisture. In *S. spartea* the robust awns, straight until maturity as is usual in all the species, become strongly twisted and twice bent when dry, but straighten and untwist when moistened. The alternate twisting and untwisting, together with the strongly barbed callus, undoubtedly aid in burying the fruits.

Cleistogenes have been found in the base of the lower sheaths in *S. leucotricha*, *S. brachychaeta*, *S. mucronata*, and *S. neesiana*, and in other South American species.

KEY TO THE SPECIES.

Terminal segment of awn conspicuously plumose, flexuous, 7 to 12 cm. long. **1. S. neomexicana.**

Terminal segment of awn not plumose.

First segment of the once-geniculate awn strongly plumose, the ascending hairs 5 to 8 mm. long ..... **2. S. speciosa.**

First segment of awn sometimes plumose but the hairs not over 2 mm. long.

Mature lemma not over 3 mm. long.

Summit of lemma bearing ascending or spreading hairs 3 to 4 mm. long. **40. S. ichu.**

Summit of lemma slightly hispidulous, but lacking long hairs. **39. S. tenuissima.**

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[9] Hughes, D. K. A revision of the Australian species of *Stipa*. Kew Bull. Misc. Inf. **1921**:1–30. 1921.

Mature lemma more than 3 mm. long, mostly more than 5 mm.
Lemma densely appressed-villous with white hairs 3 to 4 mm. long, rising above the summit in a pappus-like corona----------**6. S. coronata.**
Lemma often villous but the hairs not over 1 mm. long, or sometimes those at the summit as much as 2 mm. long.
Summit of mature lemma smooth, cylindric, whitish, forming a ciliate crown 0.5 to 1 mm. long. (Compare *S. mexicana* with crown 0.2 mm. long.)
Lemma 5 to 6 mm. long; callus about 2 mm. long; awn 3 to 5 cm. long----------**3. S. mucronata.**
Lemma 1 cm. long; callus 4 mm. long; awn 6 to 10 cm. long.
4. S. leucotricha.
Summit of mature lemma not forming a crown.
Lemma 2-lobed at summit, the lobes extending into awns 2 to 3 mm. long on each side of the central awn. California.
5. S. stillmanii.
Lemma not lobed at summit or only slightly so.
Awn plumose below, the hairs ascending or spreading, sometimes plumose throughout. (Compare *S. pulchra* with more or less appressed-hispid but not plumose awn, and *S. mexicana* with awn slightly plumose just above the lemma.)
Awn plumose throughout, once-geniculate. Lemmas with two short broad lobes----------**19. S. porteri.**
Awn plumose only below the second bend.
Lemma glabrous above the callus, brown, terete. Mexico.
14. S. leiantha.
Lemma pubescent all over. Western States.
Sheaths pubescent----------**21. S. elmeri.**
Sheaths glabrous.
Ligule 3 to 6 mm. long----------**20. S. thurberiana.**
Ligule very short.
Hairs on upper part of the lemma much longer than those below----------**26. S. californica.**
Hairs short all over the lemma---**22. S. occidentalis.**
Awn scabrous or nearly glabrous, rarely appressed-hispid, but not plumose.
Lemma more than 7 mm. (often 1 to 2 cm.) long, glabrous or sparsely pubescent above the callus, mostly cylindric (somewhat fusiform in *S. pulchra*).
Mature lemma pale, sparsely pubescent to summit, mostly over 1 cm. long----------**12. S. comata.**
Mature lemma dark.
Lemma 8 to 10 mm. long.
Glumes 3-nerved. Summit of lemma hispidulous-ciliate, the hairs erect, nearly 1 mm. long; lemma somewhat fusiform, pubescent in lines above the callus.
13. S. pulchra.
Glumes 5 to 9-nerved.
Lemma glabrous above the base, minutely roughened at apex; callus sharp and slender-tipped.
10. S. avenacea.
Lemma sparsely pubescent to apex; callus rather blunt----------**15. S. pringlei.**

Lemma 12 to 2.5 mm. long, cylindric.
Mature lemma glabrous above the callus. Florida.
8. S. avenacioides.
Mature lemma more or less pubescent above the callus.
Panicle open, the branches flexuous, glabrous below the spikelet. Mexico----------**11. S. saxicola.**
Panicle narrow, the branches appressed, straight, scabrous-pubescent below the spikelet.**9. S. spartea.**
Lemma less than 7 mm. long, or if as long as 7 to 8 mm. then distinctly pubescent on the upper part.
Culms several-noded (nodes more than 3).
Ligule less than 1 mm. long; neck of lemma short, obscure.
23. S. multinodis.
Ligule 3 to 5 mm. long; neck of lemma distinct, 1 mm. long.
24. S. constricta.
Culms 1 to 3-noded.
Panicle more or less open, the branches spreading or ascending, naked at base.
Panicle diffuse, the branches divergent, drooping; lemma about 5 mm. long; awn about 2 cm. long. Northwestern States--------**7. S. richardsoni.**
Panicle somewhat open but not diffuse. Southwestern States and Mexico.
Ligule 3 to 4 mm. long. Awn about 5 cm. long, the terminal segment flexuous.
16. S. eminens.
Ligule 1 mm. long or less.
Hairs at summit of lemma about 1 mm. long. Awn 1 to 1.5 cm. long--**17. S. clandestina.**
Hairs at summit of lemma very short. Awn 2.5 to 3.5 cm. long----------**18. S. lepida.**
Panicle narrow, the branches appressed.
Hairs on lemma copious, at least at summit, 2 mm. long.
Lemma about 8 mm. long, villous at summit, pubescent below----------**25. S. scribneri.**
Lemma about 5 mm. long, villous all over but more so above----------**36. S. pinetorum.**
Hairs not copious, not over 1 mm. long at summit.
Summit of lemma forming a slightly enlarged firm smooth ring or narrow crown.
29. S. mexicana.
Summit without crown; lemma villous throughout.
Mature lemma villous with brown hairs.
Lemma 4 mm. long; culms rarely over 30 cm. tall----------**27. S. angustifolia.**
Lemma 5 to 6 mm. long; culms mostly over 75 cm. tall----------**28. S. virescens.**
Mature lemma villous with white hairs, usually fusiform; panicles usually many-flowered.
Glumes broad, abruptly acuminate, rather firm, the first 5-nerved. Pacific coast.
30. S. lemmoni.
Glumes narrow, gradually acuminate, usually hyaline, the first usually 3-nerved.

Ligule 3 to 6 mm. long. Awn very slender, flexuous, obscurely geniculate, 3 to 4 cm. long. Mexico__**38. S. editorum.**
Ligule very short.
Awn 4 to 6 cm. long, obscurely geniculate, the untwisted terminal segment flexuous. Arizona, Utah__**37. S. arida.**
Awn mostly less than 5 cm. long, if as much as 4 cm. long, then twice-geniculate and the terminal segment straight or nearly so. Western States.
Sheaths, at least the lowermost, pubescent_____**31. S. williamsii.**
Sheaths glabrous.
Sheaths villous at the throat; callus broad and short; lower nodes of panicle villous.
Glumes thin and papery; plants rather slender, mostly less than 1 meter tall; panicle rather slender and open.
32. S. viridula.
Glumes firm, the nerves inconspicuous; plants robust, mostly more than 1 meter tall; panicle larger and more compact. Southwestern States.
33. S. vaseyi.
Sheaths not villous at the throat or only slightly so; callus comparatively narrow; nodes of panicle glabrous or nearly so.
Awn mostly more than 2 cm. long; hairs at summit of lemma about as long as the others.
34. S. columbiana.
Awn mostly less than 2 cm. long; hairs at summit of lemma longer than those on the body, 1 to 1.5 mm. long.
35. S. lettermani.

1. **Stipa neomexicana** (Thurb.) Scribn.

Stipa pennata var. *neo-mexicana* Thurb. in Coulter, Man. Rocky Mount. 408. 1885. "Extending into S. W. Colorado from New Mexico and Texas." I have not been able to locate the type of this. In the herbarium of the New York Botanical Garden there is a sheet from the Torrey Herbarium labeled "Ex Coll. Geo. Thurber. Rio Mimbres, New Mexico, April, 1851. No. 269." On the sheet is written, possibly in Dr. Gray's hand, "*S. pennata* var. *Neo Mexicana* Thurber." This specimen may be the type.

Stipa neo-mexicana Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 17: 132. *f. 428.* 1899. Based on *Stipa pennata neo-mexicana* Thurb.

DESCRIPTION.

Culms densely cespitose, erect, glabrous, about 2-noded, mostly 40 to 80 cm. tall, sometimes taller; sheaths glabrous or the lower minutely pubescent, the prophyllum puberulent; ligule very short, ciliate; blades slender, firm, convolute, glabrous beneath, scaberulous on the upper surface, the basal 10 to 30 cm. long, scarcely 1 mm. wide when unrolled; the panicle narrow, emerging from the uppermost inflated sheath, the axis mostly 3 to 8 cm. long, glabrous, bearing a few ascending branches, the lowermost 1 to 3 cm. long, mostly with 2 spikelets, the upper shorter, sometimes only 2 mm. long, mostly with a single spikelet, the pedicels more or less pubescent; spikelets pale, more or less shining; glumes papery, mostly 5-nerved (sometimes with 1 or 2 extra nerves), narrowed into a long, slender, scarcely awned point about as long as the body, the total length 3 to 5 cm., the first a little longer; fertile lemma about 15 mm. long, including the sharp, densely pilose callus (4 to 5 mm. long), about 1.5 mm. wide, at maturity brown, 5-nerved, sparsely villous, minutely tuberculate at the short, slightly constricted neck; awn readily deciduous, 12 to 18 cm. long, the lower ¼ to ⅓ straight, strongly twisted, appressed-villous, the middle segment 1 to 2 cm. long, flexuous or more or less twice-geniculate and slightly twisted, the terminal segment untwisted, flexuous, plumose, the hairs pale or tawny, about 3 mm. long. (Pl. 50, figs. 1, 2. *Chase* 5982.)

This species is allied to *Stipa pennata* L., of the steppes of Europe and Asia. The latter has a once-geniculate awn, the terminal segment of which is 30 cm. long and more strongly plumose than in the American species.

DISTRIBUTION.

Mesas, canyons, and rocky slopes, western Texas and Colorado to Utah and Arizona.

TEXAS: Guadalupe Mountains, *Chase* 5945, 5982. Upper Concho River, *Reverchon* 163, 1365. El Paso, *Vasey* in 1881.

COLORADO: La Porte, *Pammel* in 1896. Colorado Springs, *Jones* 1547. Paradox, *Walker* 79a. Rum Canyon, *Eastwood* 16 in 1892.

UTAH: Marysvale, *Jones* 5377, 5397.

NEW MEXICO: Guadalupe Mountains, *Hitchcock* 13578. Las Vegas Hot Springs, *Grant* 5761. Roswell, *Griffiths* 4272. Alamagordo, *Hitchcock* 2541. Santa Fe, *Heller* 3666.

ARIZONA: Santa Rita Mountains, *Pringle* in 1884. Clarks Valley, *Rusby* 9078. Adamana, *Chase* 5855; *Hitchcock* 10427. Jacks Canyon, *Coville* 1005. Ash Fork, *Williams* 3051; *Griffiths* 4755. Canyon Padre, *Hitchcock* 13230. Tucson, *Toumey* 732, 733. Fort Apache, *Palmer* 576. Hackberry, *Jones* 4762.

2. Stipa speciosa Trin. & Rupr.

Stipa speciosa Trin. & Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. **5**[1]: 45. 1842. "Chile (Cuming!)." The type has been examined in the Trinius Herbarium.

Stipa frigida Phil. Fl. Atacam. 54. 1860. "In monte Alto de Puquios" at 12,500 feet altitude, but in January mostly out of flower. It is described as having florets only half as large as those of *S. speciosa*. The type has not been examined and the species is referred provisionally to *S. speciosa*.

Stipa vaginata Phil. Linnaea **33**: 281. 1864–65. "Prope 'S. Felipe de Aconcaqua' crescit, unde attulit orn. Landbeck." The type has been examined. The awns are shorter than usual, each segment being about 12 mm. long. Buchtien's no. 1184 and Asplund's no. 6552 from alpine regions of Bolivia are the same.

Stipa californica Vasey, Proc. Calif. Acad. **24**: 80. 1889. Nomen nudum, based on *Palmer* 505 in 1887 from Los Angeles Bay, Lower California.

Stipa speciosa var. *minor* Vasey, Contr. U. S. Nat. Herb. **3**: 52. 1892. No specimen is cited and no sheet in the National Herbarium has this name written upon it by Dr. Vasey. On a sheet of *S. speciosa* collected by Jones at Empire

City, Nevada, in 1882, Dr. Vasey has written the name, "var. *humilis* Vasey, dwarf, or *S. chrysophylla*." This is probably the type, the name in publication being changed to *minor*.

Stipa humilis jonesiana Kuntze, Rev. Gen. Pl. 3²: 371. 1898. The only specimen mentioned is *Jones* 4111 from Empire City, Nevada, a sheet of which is in the National Herbarium.

Stipa hieronymusii Pilger, Bot. Jahrb. Engler **56**: Beibl. **123**: 24. 1920. "Argentinien: Cordillera de la Rioja, Cuesta del Peñon, südl. der Laguna brava (Hieronymus et Niederlein n. 314)." The type has been examined in the Berlin Herbarium.

DESCRIPTION.

Culms densely cespitose, rather stout, glabrous, erect, mostly 30 to 60 cm. tall, 3-noded in the larger plants; sheaths firm, striate, the upper glabrous, the lowermost pubescent, shining chestnut-brown, the uppermost often inflated at the base of the panicle; ligule very short, densely ciliate, a dense tuft of hairs about 0.5 mm. long on each side at the throat of the sheath, the uppermost longer, as much as 1 mm., and less pubescent; blades slender, coriaceous, closely involute, glabrous or scaberulous on the under or outer surface, densely scaberulous-pubescent on the upper surface, 0.5 to 1 mm. thick when rolled, 20 to 40 cm. long, the apex subulate and very sharp, the uppermost blade reduced; panicle narrow, compact, mostly 10 to 15 cm. long and 1 to 2 cm. wide, pale or tawny; the branches short and appressed, these and the axis scaberulous, spikelet-bearing to base or nearly so; glumes about equal, glabrous, pale, papery, about 15 mm. long, gradually narrowed to a fine soft point, the first 3-nerved, the second 5-nerved; lemma cylindric, coriaceous, 8 to 9 mm. long including the callus (1.5 mm. long), this densely appressed-pubescent except at the curved tip (base); the body densely soft-pubescent, slightly narrowed and sometimes glabrate upward; awn with one bend, the first segment about 2 cm. long, tightly twisted, strongly plumose on the lower two-thirds with ascending hairs about 8 mm. long, the terminal segment bent 60 to 80° from the vertical, untwisted, scabrous, 15 to 25 mm. long. (Pl. 50, figs. 3, 4. *Chase* 5747.)

DISTRIBUTION.

Deserts, canyons, and rocky hills, Colorado to southern California; also in Chile, the type locality, and Argentina.

COLORADO: Mesa Verde National Park, *Bethel* in 1918. McElmo Canyon, *Eastwood* in 1892.

UTAH: La Sal Mountains, *Rydberg & Garrett* 8585. Fish Creek *Garrett* 2598a. St. George, *Jones* 5110. Santa Clara, *Jones* 5115. La Verken, *Jones* 5183

NEVADA: Lovelock, *Griffiths & Hunter* 544. Reno, *Jones* in 1897. Candelaria' *Shockley* 104. Palisade, *Jones* 4110. Goldfield, *Tidestrom* 9734. Empire City, *Jones* 4111.

ARIZONA: Yucca, *Jones* 3919. Grand Canyon, *Chase* 5810, 5823; *Grant* 5558; *MacDougal* 223; *Hitchcock* 10451. Peach Springs, *Tracy* 135. Carrizo Mountains, *Standley* 7515. Without locality, *Lemmon* in 1882.

CALIFORNIA: Mohave Desert, *Pringle* in 1882; *Parish Brothers* 879. Lone Pine, *Jones* in 1897. Erskine Creek, *Purpus* 5077. Mountain Spring, *Schoenfeldt* 3075; *Vasey* 659; *Mearns* 3127. Mono Lake, *Bolander* 6117. Edge of Colorado Desert, *Mearns* 2963. Jacumba Hot Springs, *Schoenfeldt* 3231. Acton, *Elmer* 3709. Glenavon, *Wilder* 1092. Big Pine, *Heller* 8260. Barstow, *Chase* 5773. Randsberg, *Chase* 5758. Newberry, *Chase* 5786. San Bernardino, *Chase* 5534. Mentone, *Leiberg* 3298. Bishop Creek, *Hall & Chandler* 7261. Stanislaus, *Elmer* 4349. Campo, *Abrams* 3607. Kramer *Chase* 5747. Santa Rosa Mountains, *Hall* 2129; *Jepson* 1455. San Luis Obispo, *Lemmon* 5470. Bonanza King Mine, *Munz* 4134.

LOWER CALIFORNIA: Los Angeles Bay, *Palmer* 505 in 1887. Japa, *Orcutt* 1140.
CHILE: Quebrada Ramón, *Claude Joseph* 1781, 1788. Santiago, *Claude Joseph* 807. Atacama Desert, *Reiche* in 1901. Aconcagua, *Philippi*. San Ramón, *Claude Joseph* 2345. Maipo, *Claude Joseph* 2966.
ARGENTINA: General Roca, *Fischer* 46. Colonia San Martin, *Gerling* 70. Mazaredo, *Dusén* 5274. Cipolletti, *Parodi* 956. Choele-Choel, *Parodi* 2551. Cacheuta, *Spegazzini* 2390, 2392.
BOLIVIA: Pasña, *Buchtien* 1184. Uyuni, *Asplund* 6552.

3. Stipa mucronata H. B. K.

Stipa mucronata H. B. K. Nov. Gen. & Sp. 1: 125. 1816. "Crescit in montanis regni Mexicani, prope Actopan et vicum Magdalenae, altit. 1040 hexap." The type, in the Paris Herbarium, is labeled "Actopan regni Mexicani. Alt. 1040 hex." A photograph of the type and a fragment of the inflorescence from the type are in the U. S. National Herbarium. The type itself is only the upper part of a culm with a small panicle. The fruit is like that of the type of *S. setigera*, but the awns are wanting. The description states that the ligule is "elongata, ovata, membranacea, glabra." This elongate ligule is not true of the specimens here included nor of any other Mexican species with smooth cylindric summit. In the "H. B. K." herbarium at Paris is another specimen labeled *Stipa mucronata*, but without other data, which belongs to *S. mexicana*, having a fruit only 4 mm. long. The Actopan specimen is selected as the type, since it corresponds better to the original description.

Stipa setigera Presl, Rel. Haenk. 1: 226. 1830. "Hab. . ." The type, in the National Museum at Prague, bears no data except the name, and the source of the specimen is unknown. The sheet has two specimens upon it, both fragmentary, consisting of a panicle and the upper part of the culm. Only one corresponds to the description. Hackel has examined the same sheet and left a note attached to the type which says, "nur dieses Exempel stimmt mit Presl's Beschreibung, das andere durchaus nicht." In the type the fruit shows the characteristic smooth cylindric hispidulous crown.

Stipa trochlearis Nees & Mey. Act. Acad. Caes. Leop. Carol. 19: Suppl. 1. 151. 1843. "Ad Arequipam urbem Peruviae in campis siccis pedum 12,000 altitud., et ad lacum Titicacam." In the Berlin Herbarium is a specimen, probably the type, labeled in Nees' hand, "Ad Arequipu Peruviae. Alt. 12,000, ad Laguna nom de Titicaca. Apr. 1831. Meyen." In the Trinius Herbarium is a specimen from the Meyen Herbarium in 1836, probably a part of one of the preceding specimens, labeled "Peru, Laguna de Titicaca." The species was described by Trinius and Ruprecht [10] in 1842 and credited to "Nees et Meyen! Meyen It. 1. (1834) p. 484. N. ab Esenb. Act. Leopold. 19. p. 151." The first citation is a nomen nudum. The second is supposed to have been published in 1843 but is cited by Trinius and Ruprecht (loc. cit.) in 1842, possibly from proof sheets; or the Leopold work may have actually appeared earlier than 1843. Trinius and Ruprecht say concerning the specimens, "Ad Arequipa, urbem Peruviae, in campis siccis altit. 12,000 ped. et ad lacum Titicaca. Aprili. (*Meyen!*) Mexico (*Berlandier!* n. 604)."

Stipa amethystina Steud. Syn. Pl. Glum. 1: 124. 1854. "Hrbr. Lechler nr. 279. Arique, Chile." The type has been examined.

Stipa pratensis Phil. Linnaea 33: 284. 1864. "In Provincia Valdivia, S. Juan, Corral, etc., crescit." The type has been examined.

Stipa chapulcensis Fourn. Mex. Pl. 2: 74. 1886, "Chapulco (*Liebm.* n. 652)." The type specimen in the Copenhagen Herbarium has been examined.

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[10] Mém. Acad. St. Pétersb. VI. Sci. Nat. 3 [1]: 30. 1842.

DESCRIPTION.

Culms erect or geniculate at the lower nodes, somewhat bulbous at base, glabrous, the nodes pubescent, 60 to 100 cm. tall; sheaths glabrous, pilose at the throat and on the margin; ligule less than 1 mm. long; blades flat, becoming involute, those of the innovations involute, rather sparsely short-pilose on both surfaces, 10 to 20 cm. long, 1 to 3 mm. wide; panicle narrow, nodding, mostly purple, rather dense, 10 to 30 cm. long, the branches ascending or appressed, mostly 1 or 2 at the distant nodes, naked for 1 to 3 cm. at base, branching and bearing several or many appressed spikelets above, often a secondary panicle at the uppermost sheath; glumes about equal, rather broad, usually purple except the hyaline tip, acuminate, 8 to 10 mm. long, the first 3-nerved, scabrous on the keel, the second 5-nerved; lemma 5 to 6 mm. long, turgid, about 1 mm. wide, the callus about 2 mm. long, densely barbed with tawny hairs, the body oblong, dark brown, villous on the lower half, glabrate and strongly but minutely papillate-roughened on the upper half, abruptly contracted at summit into a smooth cylindric whitish neck or crown about 0.5 mm. long, the crown ciliate with erect stiff hairs about as long as the neck; awn slender, 3.5 to 5 cm. long, twice-geniculate, the bends sometimes obscure, twisted and appressed-hispidulous to the second bend, the first segment about 1 cm. long, the second a little shorter, the third straight or nearly so. (Pl. 50, figs. 5, 6. Type.)

DISTRIBUTION.

Dry hills and mesas, Mexico to Argentina.

NUEVO LEÓN: Monterrey, *Hitchcock* 5545.
ZACATECAS: Zacatecas, *Hitchcock* 7503, 7522; *Purpus* in 1904.
GUANAJUATO: Jaral, *Schumann* 1726.
HIDALGO: Pachuca, *Hitchcock* 6744, 6762, 6763.
MEXICO: Toluca, *Hitchcock* 6892.
FEDERAL DISTRICT: *Pringle* 1172, 6583; *Hitchcock* 5931; *Bourgeau* 672.
PUEBLA: Esperanza, *Hitchcock* 6463; *Arsène* 2177. Puebla, *Arsène* 220, 1183.
TLAXCALA: *Arsène* 30.
COLOMBIA: Bogotá, *Apollinaire & Arthur* 17.
VENEZUELA: Mucurubá, *Jahn* 774.
ECUADOR: In Andes, *Spruce* 5406. Riobamba, *Mille* 57. Quito, *Harteman* 58; *Rose* 24029; *Mille* 257. La Magdalena, *Harteman* 22. Malchinguí to Pomasqui, *Hitchcock* 20901. Huigra, *Hitchcock* 20610, 20743, 20757, 20771. Tulcán, *Hitchcock* 20975, 20994, 21037, 21092. Baños, *Hitchcock* 21900, 21920. Alausí, *Hitchcock* 20721.
PERÙ: Urubamba Valley, *Holway* 763. Chinche, *Macbride & Featherstone* 1283. Matucana, *Macbride & Featherstone* 378. Cuzco, *Hitchcock* 22483, 22505. Oroya, *Hitchcock* 22181. Goyllarisquisca, *Hitchcock* 22299, 22307. Atocsaico, Junín, *Hitchcock* 22211. Ollantaytambo, *Hitchcock* 22556.
BOLIVIA: La Paz, *Holway* 423; *Asplund* 6560; *Buchtien* 866, 3962. Sorata, *Holway* 511. Cochabamba, *Hitchcock* 22799. Palca, *Hitchcock* 22577, 22580.
ARGENTINA: North Patagonia, San Carlos Bariloche, *Buchtien* 165. Cholila, Chubut, *Illin* 135. Río Corcovado, *Illin* 268.
CHILE: Valdivia, *Philippi; Buchtien* in 1903. Valparaíso, *Buchtien* in 1895. Southern Chile, *Elliot* 216. Recinto, *Holway* 287. Budi, *Claude Joseph* 2037. Panquipulli, *Claude Joseph* 2445. San Rosendo, *Claude Joseph* 2344. San Antonio, *Claude Joseph* 2343.

4. Stipa leucotricha Trin. & Rupr.

Stipa leucotricha Trin. & Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. **5**[1]: 54. 1842. "Texas. (*Hooker!*)." The type, in the Trinius Herbarium, is labeled "Texas. I. 5.," the handwriting and label similar to those on specimens sent by Hooker. The blades are involute, glabrous beneath, the glumes about 1.5 cm. long.

Stipa ciliata Scheele, Linnaea **22**: 342. 1849. "Prope Neubraunfels leg. Römer." The type has not been examined, but the description identifies the species.

DESCRIPTION.

Culms in rather small tufts, glabrous, the nodes pubescent, erect or somewhat geniculate at base, rather slender, 30 to 60 cm. tall, sometimes as much as 1 meter tall; sheaths glabrous or the lower hispidulous, more or less villous at the throat; ligule less than 1 mm. long; blades flat, often becoming involute, hispidulous beneath, scabrous and sometimes hispidulous on the upper surface, 15 to 30 cm. long, 2 to 4 mm. wide; panicle narrow, often inclosed at base in the uppermost somewhat inflated sheath, mostly not over 10 cm. long, the branches slender, distant, scabrous, mostly in pairs, ascending, bearing 1 or 2 spikelets; glumes pale or purple, rather narrow, nearly equal, tapering to a slender soft awnlike point, mostly 12 to 18 mm. long, the first 3-nerved, the second 5-nerved, with additional intermediate nerves sometimes present; lemma about 1 cm. long, the slender callus very sharp, densely barbed with pale yellow hairs, about 4 mm. long, the body oblong, brown or brownish, appressed-pubescent on the lower part, densely papillate-roughened at least toward the summit, abruptly narrowed into a cylindric smooth neck about 1 mm. long, the crown a little wider, ciliate with short stiff erect hairs; awn 6 to 10 cm. long, rather stout, twice-geniculate, the first segment hispidulous, twisted, 2 to 3.5 cm. long, the second 1.5 to 2 cm. long, the third straight, slender. (Pl. 50, figs. 7, 8. *Hitchcock* 5138.)

DISTRIBUTION.

Dry open grassland, Texas to central Mexico.

Texas: Dallas, *Reverchon* 1056, in *Curtiss N. Amer. Pl.* 3419,* *Bebb* 1346. Big Spring, *Tracy* 8109; *Hitchcock* 13382. Grand Saline, *Reverchon* 4127. Waller, *Hitchcock* 1227½. Kerrville, *Hitchcock* 5259. Fort Worth, *Ruth* 167. Bexar County, *Jermy* 208. San Antonio, *Hitchcock* 5138; *Ball* 912. Robstown, *Hitchcock* 5392. New Braunfels, *Hitchcock* 5194. Corpus Christi, *Hitchcock* 5369; *Heller* 1558. Fort Clark, *Mearns* 1470 (awn about 3 cm. long). Austin, *Hall* 766. Without locality, *Lindheimer* 561.
Oklahoma: Fort Towson, *Houghton* 3961.
Coahuila: Diaz, *Pringle* 8292.
Zacatecas: Zacatecas, *Hitchcock* 7495.
San Luis Potosí: Cárdenas, *Hitchcock* 5714.
Federal District: *Hitchcock* 5918; *Rose & Painter* 8636.

5. Stipa stillmanii Boland.

Stipa stillmanii Boland. Proc. Calif. Acad. **4**: 169. 1872. "Blue Canon, Sierra Nevada, July, 1870." Bolander says, "Dr. J. D. B. Stillman was a pioneer botanist of California, who * * * performed a journey through the northern part of the State for the purpose of making a collection of California plants, which he forwarded to Doctor Torrey." There are 5 sheets of the type collection in the National Herbarium, one of them, from the California Academy of Sciences, bearing the published data, "Blue Canon, Sierra Nevada Mts., July, 1870."

DESCRIPTION.

Culms rather stout at base, erect, glabrous, 4 or 5-noded, 70 to 100 cm. tall; sheaths glabrous, puberulent on the collar; ligule a very short ciliate ridge; blades firm, flat, glabrous beneath, scabrous on the upper surface, 15 to 30 cm. long, 3 to 6 mm. wide, the uppermost short and involute; panicle pale, narrow, compact, spikelike, interrupted below, 10 to 20 cm. long, the branches short and appressed, villous at base, the axis and branches scaberulous or scabrous; glumes equal, 15 to 18 mm. long, rather thin, narrowed into a scabrous awn 2 to 3 mm. long, scaberulous, the first 1-nerved, the second obscurely 3 to 5-nerved; lemma pale, about 8 mm. long, the callus rather blunt, 1 mm. long, densely barbed with tawny hairs, the body gradually narrowed from above the base, appressed-villous all over, 2-lobed, the lobes awn-tipped, 2 to 3 mm. long; awn 2.5 to 3 cm. long, somewhat bent at the middle and with another obscure bend below, scabrous, twisted below the bend. (Pl. 50, figs. 9, 10. *Bolander*.)

DISTRIBUTION.

Known only from the type collection.

CALIFORNIA: Blue Canyon, Sierra Nevada, *Bolander* in 1870.

6. **Stipa coronata** Thurb.

Stipa coronata Thurb. in S. Wats. Bot. Calif. **2**: 287. 1880. "Hills near Julian City, San Diego County (*Bolander*); near San Bernardino, *Parry & Lemmon* n. 422 (1876)." In the U. S. National Herbarium is a specimen, "Distributed by George Thurber," which was collected "in a canyon around springs on hillsides near Julian City, San Diego Co., Apr. 1872." This is probably a duplicate type.

DESCRIPTION.

Culms stout, erect, glabrous, usually 1 to 2 meters tall, as much as 6 mm. thick at base, 3 or 4-noded; sheaths glabrous, pubescent at the throat and along the margins above; ligule a very short membrane less than 1 mm. long, ciliate with hairs of variable length, sometimes as long as the ligule; blades flat, more or less involute toward the long slender tip, firm, glabrous beneath, scaberulous on the upper surface, scabrous on the margin, 30 to 60 cm. long, as much as 1 cm. wide; panicle pale or purplish, narrow, densely flowered, somewhat nodding, the branches appressed, several from each node, the longer ones naked below, as much as 15 cm. long, bearing several branchlets, the axis and branches glabrous, the branchlets and pedicels usually scabrous; glumes unequal, the first longer, 15 to 20 mm. long, narrowed to a fine point, both 5-nerved, glabrous or minutely scaberulous; lemma about 9 mm. long, pale, densely appressed-villous with white hairs 3 to 4 mm. long, the callus 1.5 mm. long, densely barbed; awn 3.5 to 5 cm. long, scabrous, twice-geniculate, twisted to the second bend, the first segment about 1 cm. long, the second a little shorter, hispidulous, the third straight, scabrous. (Pl. 50, figs. 11, 12. *Orcutt* 1068.)

DISTRIBUTION.

Gravelly plains and rocky slopes, California.

CALIFORNIA: Bernardo, *Abrams* 3360. Colton, *Pringle* in 1882. San Diego, *Orcutt*, 1068. Tassajara Hot Springs, *Elmer* 3302. Roscoe, *Eastwood* 230. San Bernardino Mountains, *Parish Brothers* 872. San Bernardino, *Chase* 5532, 5537; *Parish* 1656, 3665; *Jepson* 5528. Mount Wilson, *Chase* 5580. Echo Mountain, *Chase* 5558. Riverside, *Griffiths* 7850. San Gabriel Forest Reserve, *Leiberg* 3336. Santa Monica Mountains, *Abrams* 1305. San Jacinto Mountains, *Hall* 2078. Julian, *Hitchcock* 13156. Claremont, *Baker* 5282. Corn Peak, *Davy* 7716. Pico Blanco, *Davy* 7345. Ojai Valley, *Hubby* 27.

6a. Stipa coronata parishii (Vasey) Hitchc.

Stipa parishii Vasey, Bot. Gaz. 7: 33. 1882. "Collected in the San Bernardino Mts., by Mr. S. B. Parish, for whom it is named." The type, in the U. S. National Herbarium, is *Parish Brothers* 1079.

Stipa parishii var. *depauperata* Jones, Contr. West. Bot. 14: 11. 1912. "Detroit, Utah, May 25, 1891." The type is in Mr. Jones's herbarium. A fragment in the U. S. National Herbarium shows the panicle to be much reduced. The glumes are about 1 cm. long, and the once-geniculate awns about 12 to 15 mm. long.

DESCRIPTION.

The normal form of the subspecies differs in being only 30 to 50 cm. tall, with a rather few-flowered panicle 10 to 15 cm. long, blades 10 to 20 cm. long, and often smaller spikelets, the lemma being 6 to 7 mm. long, and the awn about 2.5 cm. long, once-geniculate, the first segment twisted and scabrous-pubescent, about 1 cm. long, the second segment bent about horizontally, straight, scabrous.

This description applies to the type of the subspecies and a few specimens from San Bernardino and San Jacinto Mountains. Several other specimens are intermediate. Schoenfeldt's no. 3220 from Jacumba Hot Springs is a fairly robust plant with a dense panicle 20 cm. long, having the aspect of the species but with a short once-geniculate awn. Mearns's no. 3312 from the same locality and Schoenfeldt's no. 3441 from Lower California have a less dense panicle with twice geniculate awns 3 to 4 cm. long. Hitchcock's no. 13062 from Grand Canyon resembles in appearance the last-mentioned specimen, being about 1 meter tall, but the awns are about 2.5 cm. long and obscurely twice-geniculate, neither bend being pronounced. In all these specimens the lemma is shorter than in the species. Because of the slight differences and the intermediate specimens it seems better to place *S. parishii* under *S. coronata* as a subspecies. (Pl. 50, fig. 13. *Parish Brothers* 1079.)

DISTRIBUTION.

Dry or rocky slopes, southern California.

UTAH: Detroit, *Jones* in 1891.

NEVADA: Charleston Mountains, *Heller* 11052. Candelaria, *Shockley* 283.

ARIZONA: Grand Canyon, *Hitchcock* 13062.

CALIFORNIA: San Bernardino Mountains, *Parish Brothers* 1079; *Parish* 3287, 10230; *Wilder* 1127; *Hall* 7580. Tanquitz, San Jacinto Mountains, *Hall* 2309. San Antonio Mountains, *Johnston* 1515. Jacumba, *Abrams* 3637. Jacumba Hot Springs, *Schoenfeldt* 3220; *Mearns* 3312. Los Angeles, *Davidson*. Baldy Mountain, *Abrams & McGregor* 623. Southeastern California, *Purpus* 5452. Funeral Mountains, *Coville & Funston* 328. Mill Creek Falls, *Parish* 2487. Without locality, *Lemmon* 5431. Bonanza King Mine, *Munz* 4133, 4249.

LOWER CALIFORNIA: Nachoguero Valley, *Schoenfeldt* 3441. Sierra Cantillas, *Orcutt* 1151.

7. Stipa richardsoni Link.

Stipa richardsoni Link, Hort. Berol. 2: 245. 1833. "Hab. in America boreali occidentali. Dr. Richardson semina misit." The type has been examined at the Berlin Herbarium. The third segment of the awn is about 1.5 cm. long.

Stipa richardsoni var. *major* Macoun, Cat. Can. Pl. 4: 191. 1888. No description is given. "This form exactly matches Scribner's No. 341 from Montana."

DESCRIPTION.

Culms erect, glabrous, 50 to 100 cm. tall; sheaths glabrous, sometimes a little villous at the throat, the lower sometimes puberulent; ligule less than 1 mm. long; blades involute, scabrous, mostly less than 2 mm. wide when flat, 10 to 15 cm. long, sometimes longer; panicle open, 10 to 20 cm. long, the branches slender, mostly in pairs, distant, spreading or drooping, naked below, 8 to 15 cm. long, scabrous, bearing near the end a few spikelets on short branches; glumes 8 to 9 mm. long, about equal or the first a little longer, rather firm and broad, scaberulous, acute but not long-acuminate, often purplish, 3-nerved but the nerves rather obscure; lemma about 5 mm. long, the callus about 1 mm. long, densely barbed with white hairs, the body fusiform, brown, villous, sparingly villous or glabrate toward the minutely papillate, narrowed summit; awn 2.5 to 3 cm. long, twice-geniculate but the first bend often obscure, appressed-hispidulous and twisted to the second bend, the first and second segments together 7 to 9 mm. long, the third segment straight, scabrous. (Pl. 50, figs. 14, 15. *Hitchcock* 11468.)

DISTRIBUTION.

Bottom lands and wooded slopes, Saskatchewan to Colorado and British Columbia.

SASKATCHEWAN: Without locality, *Macoun* 103.

ALBERTA: Jasper, *Macoun* 98207. Banff, *Hitchcock* 5035, 11468. Waterton Lake, *Macoun* 13346. Old Bow Fort, *Macoun* 131. Silver City, *Macoun* in 1885.

BRITISH COLUMBIA: Shusmap Lake, *Macoun* 15.

SOUTH DAKOTA: Custer, *Griffiths* 703; *Rydberg* 1113.

MONTANA: Columbia Falls, *Hitchcock* 4940; *Williams* 601. North Fork Smith River, *Scribner* 341. Anaconda, *Jones* in 1905. Jack Creek Canyon, *Rydberg & Bessey* 3549. Garrison, *Rydberg* 2125. Silver Bow, *Rydberg* 2109. Castle, *Rydberg* 3233; *Shear* 357. Monarch, *Spragg* 691. Medicine Springs, *Chase* 5229. Lolo Hot Springs, *Chase* 5135.

WYOMING: Big Horn Mountains, *Williams* 2732. South Fork Clear Creek, *Williams & Griffiths* 97a. Sour Dough Creek, *Williams & Griffiths* 97. Crazy Woman Creek, *Williams & Griffiths* 23. Teton Forest Reserve, *Tweedy* 68; *Merrill & Wilcox* 372, 395. Welcome, *Williams* 2676½. Inyan Kara Mountain, *Griffiths* 649, 666. Yellowstone National Park, *Tweedy* 611; *Hitchcock* 1963; *Nelson* 5900, 5940; *Knowlton* in 1888.

COLORADO: North Park, *Crandall* in 1890. Laramie County, *Osterhout* in 1897.

8. Stipa avenacioides Nash.

Stipa avenacioides Nash, Bull. Torrey Club **22**: 423. 1895. "Collected by writer in 1895 in the pine lands near Cassia, Lake Co., Florida, no. 2051." The type collection is widely distributed. Cassia is in the vicinity of Eustis.

DESCRIPTION.

Culms in small tufts, erect, glabrous or minutely scaberulous, 2 or 3-noded, about 1 meter tall; sheaths glabrous or minutely scaberulous; ligule 2 to 3 mm. long, decurrent; blades slender, involute, glabrous beneath, less than 1 mm. thick when rolled, 15 to 30 cm. long, the uppermost reduced; panicle open, 10 to 20 cm. long, the branches mostly in two's, slender, spreading, few-flowered, naked below, the pairs distant; glumes equal, about 2 cm. long, broad, often purple, tapering into a point, papery, faintly several-nerved, glabrous; lemma brown, linear, 1.5 to 2 cm. long including the callus, this about 7 mm. long, tapering into a fine point, densely barbed with brown hairs, the body glabrous, minutely papillate

at the slightly contracted neck, slightly hispidulous on the crown; awn, 8 to 11 cm. long, scabrous, twice-geniculate, the second bend at about the middle, the first segment twisted, about 3 to 4 cm. long, the second slightly twisted, the third straight. (Pl. 50, figs. 16, 17. *Curtiss* 5834.)

DISTRIBUTION.

Dry pine woods, peninsular Florida.

FLORIDA: Okeechobee region, *Fredholm* 5725. Clarcona, *Meislahn* 191. Palma Sola, *Tracy* 7031. Manatee, *Combs* 1335. Grasmere, *Combs & Baker* 1075 1155. Merrimack, *Baker* 115. Eustis, *Nash* 2051. Eau Gallie, *Curtiss* 5834. Duval County, *Fredholm* 5092. Tavares, *Hitchcock* 812. Braidentown, *Hitchcock* 967.

9. **Stipa spartea** Trin.

Stipa spartea Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 1: 82. 1830. "V. spp. Amer. bor." [Specimen seen from North America.] The type, in the Trinius Herbarium, is labeled "Rocky Mountains near the Missouri, no. 253 of Hook. Cat." The mature lemma is 16 mm. long, first segment of awn 7.5 cm., second segment, 1.5 cm., third segment 5 cm. long. The original spelling of the specific name is *sparta*, but Trinius corrects this later to *spartea*.[11]

DESCRIPTION.

Culms in small tufts, erect, glabrous, about 1 meter tall, mostly 2-noded; sheaths glabrous; ligule rather firm, 4 to 5 mm. long, decurrent, shorter on the innovations; blades flat, more or less involute in drying, glabrous beneath, very scabrous and sometimes pubescent on the upper surface, 20 to 30 cm. long, 3 to 5 mm. wide, tapering to a capillary point, those of the innovations more slender, often involute, and sometimes 50 or 60 cm. long; panicle narrow, nodding, 15 to 20 cm. long, the branches few, distant, solitary or clustered, slender, ascending, scabrous, bearing 1 or 2 spikelets, the lowermost as much as 10 cm. long, all finally drooping with the weight of the fruit; glumes nearly equal, narrow, pale, papery, glabrous, with 5 strong nerves and additional intermediate nerves, 3 to 4 cm. long, tapering to a fine soft awnlike point; lemma subcylindric, brown, 1.6 to 2.5 cm. long, the callus about 7 mm. long, gradually tapering to a fine sharp point, densely barbed with brown hairs, the body slightly tapering above the callus, decreasingly pubescent upward, the upper half minutely roughened, glabrous except for a line of pubescence on one side, the crown ciliate with short erect hairs; awn stout, 12 to 20 cm. long, twice-geniculate, the first segment scabrous, twisted, 5 to 8 cm. long, the second more loosely twisted, flexuous, mostly 2 to 3 cm. long, the third straight, slender. (Pl. 50, figs. 18, 19. *Hitchcock* 11020.)

Standley's no. 6223 from New Mexico is like *S. spartea* in size, but the floral parts are smaller than usual for that species. It is intermediate between this and *S. spartea curtiseta*.

DISTRIBUTION.

Prairies, Ontario to British Columbia, and south to Kansas.

ONTARIO: Sarina, *Morris* 194. Squirrel Island, *Dodge* 61.
MANITOBA: Birtle, *Herriot* 77178.
ALBERTA: Edmonton, *Hitchcock* 11368.
BRITISH COLUMBIA: Kamloops, *Macoun* 17. Lower Arrow Lake, *Macoun* 105.

[11] Mém. Acad. St. Pétersb. VI. Sci. Nat. 1: 68. 1842.

INDIANA: Morocco, *Deam* 31659. Lake Maxinkuckee, *Clark* 1856. Pretty Lake, *Deam* 15939. Dune Park, *Chase* 2042, 6146. Miller, *Chase* 1794. Porter County, *Deam* 36679.
ILLINOIS: Galva, *V. H. Chase* 1750. Joliet, *Skeels* 248. Hanover, *Gleason & Gates* 2602. St. Clair County, *Eggert* 280. Wady Petra, *V. H. Chase* 1206. Naperville, *Kneucker Gram. Exs.* 846.
MICHIGAN: Akron, *Dodge* in 1910. Woodward Lake, *Wheeler* in 1880. Lansing, *Beal* in 1881.
WISCONSIN: Polk County, *Burglehaus* in 1892. Milwaukee, *Lapham*. Lauderdale, *Bebb* 2061.
MINNESOTA: Fort Snelling, *Mearns* 737. Heron Lake, *Skinner* 54. Spring Grove, *Rosendahl* 314. Minneapolis, *Sandberg* 299.
NORTH DAKOTA: Grand Forks, *Brannon* 12. Leeds, *Lunell* in 1901. Fargo, *Minns*.
SOUTH DAKOTA: Aberdeen, *Griffiths* 820. Custer, *Rydberg* 1110; *Hitchcock* 11113.
IOWA: Missouri Valley, *Pammel* 672. Marshall County, *Ball* 18. Little Rock, *Ball* 406. Iowa City, *Somes* 3216. Ames, *Hitchcock* 11020; *Ball* 177.
NEBRASKA: Halsey, *Hitchcock* 11062. Thedford, *Rydberg* 1402.
MISSOURI: Lees Summit, *Bush* 302, 3937.
KANSAS: Manhattan, *Hitchcock* 2520, 10418. Riley County, *Norton* 592.
WYOMING: Bear Lodge Mountains, *Griffiths* 990; *Williams* 2640. Manhattan, *Williams* 2683.
NEW MEXICO: Sierra Grande, *Standley* 6223.

9a. **Stipa spartea curtiseta** Hitchc., subsp. nov.

DESCRIPTION.

Differing from the typical form of the species in the shorter awn, shorter glumes, and shorter fruiting lemma. Culms rather slender, mostly 30 to 60 cm. tall; blades mostly slender and involute; glumes mostly 2 to 3 cm. long; fertile lemma mostly 12 to 15 mm. long; first segment of awn 2 to 4 cm. long, the third segment 1 to 4 cm. long.

Type in the U. S. National Herbarium, no. 745,744, collected in Hound Creek Valley, Montana, August 1, 1883, by F. Lamson-Scribner (no. 339).

This form may represent a distinct species, but the differences by which it is distinguished from *S. spartea* are those of degree rather than of kind. The nearly distinct range would indicate a transition to a distinct species.

Some of the specimens have been referred previously to *S. comata intermedia*, from which this form can be distinguished by the differences between the mature lemmas and the ligules (the same characters which distinguish *S. comata* and *S. spartea*). In *S. comata* the lemma is pale and more or less villous to the summit and the ligule is long and papery; in *S. spartea* the lemma is brown and glabrous on the upper part, except for a line of pubescence along one side, and the ligule is short and firm.

DISTRIBUTION.

Dry open ground, Manitoba to Alberta and Wyoming.

MANITOBA: Birtle, *Herriot* 77177.
SASKATCHEWAN: Bredenburg, *Herriot* 77179. Prince Albert, *Macoun* 13344.
ALBERTA: Waterton Lake, *Macoun* 13343.
MONTANA: Hound Creek Valley, *Scribner* 339. Central Montana, *Spragg* 408. Columbia Falls, *Williams* 960. Flathead Region, *Ayres* in 1883.
WYOMING: Sundance, *Griffiths* 478.

10. Stipa avenacea L.

Stipa avenacea L. Sp. Pl. 78. 1753. "Habitat in Virginia." The type, in the Linnaean Herbarium,[12] is from Gronovius.

Stipa barbata Michx. Fl. Bor. Amer. **1**: 53. 1803. Not *S. barbata* Desf. 1798. "Hab. in sylvis Virginia et Carolinae superioris." The specimen, in the Michaux Herbarium at Paris, is labeled "In sylvis Virginiae Carolinae."

Stipa virginica Pers. Syn. Pl. **1**: 99. 1805. Persoon renames *S. barbata* Michx. and cites the same habitat.

Stipa diffusa Willd. "hbr."; Steud. Nom. Bot. ed. 2. **2**: 642. 1841, as synonym of *S. avenacea* L.

DESCRIPTION.

Culms few in a tuft, erect, glabrous, 60 to 100 cm. tall; sheaths glabrous; ligule rather firm, about 3 mm. long on the culm leaves, about 2 mm. long on the innovations; blades flat (about 1 mm. wide) or involute, very slender, glabrous, sometimes scabrous especially toward the tip, 20 to 30 cm. long, the uppermost culm blade reduced; panicle open, 10 to 15 cm. long, the branches in two's or three's, distant, slender, scabrous, ascending, finally drooping, mostly 2 to 4 cm. long, bearing 1 or 2 spikelets; glumes equal, about 1.5 cm. long, papery, rather broad, somewhat abruptly contracted into an acuminate point, 5-nerved, the first sometimes obscurely so; lemma dark brown, 9 to 10 mm. long, the sharp acute callus about 2 mm. long, densely barbed, the upper hairs 2 to 3 mm. long, the body glabrous, papillate-roughened toward the summit, not narrowed into a neck, the crown slightly hispidulous; awn scabrous, 4.5 to 6 cm. long, twice-geniculate, the first segment twisted, about 2 cm. long, the second slightly twisted, 1 cm. long, the third straight. (Pl. 50, figs. 20, 21. *Kneucker Gram. Exs.* 564.)

DISTRIBUTION.

Dry or rocky open woods, Massachusetts to Florida and Texas.

MASSACHUSETTS: Malden, *Boott* in 1861. Marthas Vineyard, *Seymour* 1060.
CONNECTICUT: North Stonington, *Weatherby* 4122.
NEW YORK: Eastport, *Chase*, 7401.
NEW JERSEY: Egg Harbor, *Chase* 7312.
PENNSYLVANIA: Philadelphia, *Scribner* in 1881.
INDIANA: Mongo, *Deam* 20709; 36302.
MICHIGAN: Portage, *Burgess* 227.
DELAWARE: Wilmington, *Commons* in 1875.
MARYLAND: Great Falls, *Chase* 2321; *Kneucker, Gram. Exs.* 564; *Ball* 707. High Island, *Pollard* 322.
VIRGINIA: Great Falls, *Chase* 3705. Hampton, *Miller* in 1903. Northwest, *Kearney* 1102.
NORTH CAROLINA: Wilmington, *Chase* 7220. Biltmore, *Biltmore Herbarium* 960b, 960. Chimney Rock Mountain, *Biltmore Herbarium* 960a.
SOUTH CAROLINA: Spartanburg, *McCarthy* in 1888. Clemson College, *Hitchcock* in 1901.
GEORGIA: Stone Mountain, *Eggert* 36; *Hitchcock* 1346. Lookout Mountain, *Ruth*, 93.
FLORIDA: Old Town, *Combs* 876. Lake City, *Rolfs* 43. Gainesville, *Garber* in 1876.
TENNESSEE: Knoxville, *Ruth* in 1895. Lenoir, *Matthews* in 1897.
ALABAMA: Montgomery, *Mohr* in 1868. Tuskegee, *Carver* 44. Auburn, *Hitchcock* 1318, 1341.
MISSISSIPPI: Biloxi, *Tracy* 4544.
LOUISIANA: Natchitoches, *Ball* 158. Calhoun, *Hitchcock* 1271.
TEXAS: Houston, *Hall* 765. Palestine, *Plank* 53. Angelina County, *Reverchon* 4128.

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[12] Types of American Grasses Contr. U. S. Nat. Herb. **12**: 122. 1908.

11. **Stipa saxicola** Hitchc., sp. nov.

DESCRIPTION.

Culms glabrous, slender, 60 cm. tall; sheaths glabrous; ligule of culm leaves firm, 2 to 3 mm. long, of the innovations less than 1 mm. long; blades slender (0.5 to 1 mm. thick), involute, glabrous, 10 to 20 cm. long; panicle open, 10 cm. long, the branches slender, flexuous, distant, in pairs, bearing one or two spikelets, sparingly scabrous, the bracts at the base of the branches 2 to 3 mm. long; glumes nearly equal, 2.5 to 3 cm. long, long-acuminate, 5-nerved, glabrous; lemma brown, 1.5 cm. long, the callus slender, very sharp, densely barbed with tawny hairs, the body sparsely villous, the summit with a few erect short stiff hairs; awn 7 to 8.5 cm. long, twice-geniculate, the first segment 2 to 3 cm. long, twisted, pubescent with short appressed hairs, the second segment like the first, 1.5 to 2 cm. long, the third straight, scabrous. (Pl. 51, figs. 1, 2. *Hitchcock* 6488.)

Type in U. S. National Herbarium, no. 993,394, collected on a rocky hill, Esperanza, State of Puebla, Mexico, August 28, 1910, by A. S. Hitchcock (no. 6488). This is the only specimen seen.

This resembles *Stipa spartea curtiseta* in general appearance, but differs in the more open panicle, with slender flexuous branches, and the sparsely villous body of the lemma.

In an earlier work on Mexican Grasses [13] this specimen was referred to *S. melanosperma* Presl. The latter has pilose panicle branches and pedicels, the body of the fruiting lemma is glabrous, and the nerves of the glumes are connected by a few flexuous anastomosing lines. The type locality of *S. melanosperma* is unknown. The type, which was examined at the National Museum at Prague, consists of a panicle only, and the label bears nothing but the name.

Hassler's no. 9469 from Paraguay, named by Hackel [14] *Stipa melanosperma* var. *erythrina*, answers to the description in every detail except that Presl says the nerves of the glumes are hispid ("nervis pilis brevissimis rigidulis hispidae") However, the glumes of the type of *S. melanosperma* are glabrous. Haenke, who collected the latter species, visited Chile, but the species is not known from that country. Hassler's no. 12090 from Paraguay and Dusen's no. 10874 from Paraná are also *S. melanosperma*. All three specimens agree in having the nerves of the glumes connected by anastomosing lines as in the type. Spegazzini [15] includes *S. melanosperma* in his account of the Stipeae Platenses, recording it from Paraguay and from Santa Fé.

12. **Stipa comata** Trin. & Rupr.

Stipa comata Trin. & Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. **5**[1]: 75. 1842. "Carlton House Fort ad fl. Saskatchawan (Drummond); ad ripas et in planitie fl. Columbia prope 'Missouri Portage' (Douglas)." The type, in the Trinius Herbarium, is the first of the specimens cited, and is labeled "Stipa capillata T 12 Hooker mis." Trinius and Ruprecht cite with the original description two synonym, *S. juncea* Nutt. not L., with doubt, and "*Stipa capillata* Hooker! Fl. Bor. Amer. 2. (1840) p. 237." In the type the glumes are 2 cm. long, the lemma 12 mm. long, the awn about 15.5 cm. long, the first segment 3 cm., the second, 1.5 cm. and the third, sinuous. Hooker misapplied the name *S. capillata L.*

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[13] Contr. U. S. Nat. Herb. **17**: 282. 1913.
[14] Repert. Nov. Sp. Fedde **6**: 345. 1909.
[15] Anal. Mus. Nac. Montevideo **4**: 67. 1901.

DESCRIPTION.

Culms cespitose, glabrous or sometimes puberulent around the nodes, 30 to 60 cm. tall, rarely as much as 1 meter; sheaths glabrous or scabrous, naked at the throat, the uppermost usually inflated; ligule thin, 3 to 4 mm. long, decurrent, 1 to 2 mm. long on the innovations; blades flat or involute, smooth or scaberulous beneath, scaberulous on the upper surface, 10 to 30 cm. long, the uppermost shorter, 1 to 2 mm. wide; panicle narrow, 10 to 20 cm. long, usually partly inclosed in the uppermost sheath, the branches slender, scabrous, ascending or appressed, naked below, mostly two at a node, bearing one to few spikelets, the lowermost as much as 10 cm. long; glumes 1.5 to 2 cm. (rarely 3) cm. long, about equal, papery, gradually narrowed to a soft awnlike point, 5-nerved; lemma 8 to 12 mm. long, mostly about 1 cm., pale or finally brownish, the callus about 3 mm. long, slender, very acute, densely barbed with tawny hairs, the body slightly tapering from just above the callus, villous with short appressed hairs or glabrate toward the summit, the joint with the awn distinct, glabrous or slightly hispidulous; awn indistinctly twice-geniculate, scabrous, somewhat deciduous, the first segment straight, twisted, 1.5 to 4 cm. long, the second loosely twisted, flexuous, mostly 1 to 2 cm. long, the third capillary, very sinuous or merely curved, mostly 10 to 12 cm. long. (Pl. 51, figs. 3, 4. *Hitchcock* 1700.)

DISTRIBUTION.

Prairies, plains, and dry hills, Minnesota to Yukon Territory, south to Texas and California.

MANITOBA: Brandon, *Macoun* 13342.
SASKATCHEWAN: Moose Jaw, *Macoun* 13341.
ALBERTA: Rosedale, *Moodie* 952. Lethbridge, *Hitchcock* 4964. Calgary, *Hitchcock* 11452. Edmonton, *Hitchcock* 11376.
BRITISH COLUMBIA: Kamloops, *Macoun* 19. Spences Bridge, *Macoun* 20. Lake Osoyoos, *Macoun* 77228. Lillooet, *Macoun* 91570.
YUKON: Five Finger Rapids, Tarleton 85.
INDIANA: Noble County, *Deam* 40826.
WISCONSIN: Brown County, *Schuette* in 1883.
MINNESOTA: St. Anthony Park, *Oswald* in 1911.
NORTH DAKOTA: Devils Lake, *Brannon* 54. Leeds, *Lunell* in 1901 and 1911. Dickinson, *Ball* 2100.
SOUTH DAKOTA: Aberdeen, *Griffiths* 86. Custer, *Hitchcock* 11110; *Rydberg* 1111. Edgemont, *Hitchcock* 11093.
IOWA: Little Rock, *Ball* 406.
NEBRASKA: North Platt, *Rydberg* 2024; *Shear* 278. Halsey, *Hitchcock* 11044. Thedford, *Rydberg* 1344.
KANSAS: Garden City, *Hitchcock* in 1903. Morton County, *Hitchcock* 593.
TEXAS: Paloduro Canyon, *Reverchon* 2821. Big Spring, *Tracy* 7910. Channing, *Williams* 3060.
MONTANA: Billings, *Hitchcock* 11202. Smith River, *Scribner* 338. Spanish Basin, *Rydberg* 3152. Manhattan, *Shear* 433, 2195; *Rydberg* 2196. Melrose, *Shear* 350. Hamilton, *Chase* 5205. Wilsall, *Suksdorf* 238. Bozeman, *Tweedy* 1015.
WYOMING: Sundance, *Griffiths* 509, 944. Gillette, *Hitchcock* 11190. Guernsey, *Nelson* 8313. Jacksons Hole, *Merrill & Wilcox* 277. Orin Junction, *Williams* 2569. Cassa, *Nelson* 8360. Red Desert, *Nelson* 7135. Yellowstone National Park, *Hitchcock* 1917.

IDAHO: Shoshone Falls, *Chase* 4706. Caldwell, *Chase* 4764. American Falls, *Chase* 4668. Jerome, *Chase* 4691. Pocatello, *Chase* 4634, 4647; *Hitchcock* 1835. Nez Perce County, *Sandberg, Heller & MacDougal* 293. Big Butte Station, *Palmer* 213 in 1893. Payette Project, *Macbride* 871.

WASHINGTON: Douglas County, *Sandberg & Leiberg* 240. Washtucna, *Elmer* 1033. Spokane, *Piper* 2600. Wenatchee, *Whited* 1130, 1229. Sunnyside, *Griffiths & Cotton* 19.

OREGON: Dalles, *Howell* in 1881. Bulton Springs, *Leiberg* 388. Snake River, *Sheldon* 8204. Catlow Valley, *Griffiths & Hunter* 322.

COLORADO: Arboles, *Baker* 220. Trinidad, *Standley* 6015. Salida, *Eggleston* 6671. Delta, *Tidestrom* 2174. Manitou, *Chase* 5301; *Hitchcock* 1700. Platte River, *Jones* 201.

UTAH: Indianola, *Tidestrom* 2243. Marysvale, *Rydberg & Carlton* 7052; *Jones* 5388. La Sal Mountains, *Rydberg & Garrett* 8592. La Verken, *Jones* 5182. Springdale, *Jones* 5252. Silver Reef, *Jones* 5163. Milford, *Jones* 1786. Glenwood, *Ward* 73.

NEVADA: Austin, *Hitchcock* 10605. Karshaw, *Gooding* 966. Reese Valley, *Watson* 1293. Ely, *Hitchcock* 10848. Lone Mountain, *Hitchcock* 10728. Kings Canyon, *Baker* 1116. Truckee Mountains, *Watson* 1294.

NEW MEXICO: Santa Fe, *Heller* 3576 Raton, *Standley* 6260. Tunitcha Mountains, *Standley* 7676, 7819. Raton Mountains, *Griffiths* 5106. Ute Park, *Standley* 14300.

ARIZONA: Flagstaff, *Hitchcock* 13236; *Chase* 5835, 5842; *Leiberg* 5556. Adamana, *Chase* 5857; *Hitchcock* 10425. Hell Canyon, *Rusby* 46. Little De Motte Park, *Jones* 6056. Grand Canyon, *Hitchcock* 10445.

CALIFORNIA: Benton, *Tidestrom* 9993. Orland, *Heller* 11434. Mount Tallac, *Hitchcock* 3125. Mono Lake, *Bolander* 26. Bishop Creek, *Davidson* 2536.

12a. Stipa comata intermedia Scribn.

Stipa comata intermedia Scribn. Bot. Gaz. **11**: 171. 1886. Not *S. intermedia* Trin. 1842. "Junction Butte, alt. 6,000 ft." The article is on a collection of grasses made in Yellowstone Park by Frank Tweedy. The specimen described, no. 610, is in the U. S. National Herbarium.

Stipa tweedyi Scribn. U. S. Dept. Agr. Div. Agrost. Bull. **11**: 47. 1898. A new name for *Stipa comaia intermedia* Scribn.

Stipa spartea var. *tweedyi* Jones, Contr. West. Bot. **14**: 11. 1912. Based on *S. tweedyi* Scribn.

DESCRIPTION.

Differing from *Stipa comata* in the shorter straight third segment of the awn; glumes and lemma averaging a little longer; panicle usually exserted from the uppermost sheath. The ligule is long, as in *S. comata*. (Pl. 51, fig. 5. *Tweedy* 610.)

DISTRIBUTION.

Habitat and range as in *S. comata*, but not extending so far east.

SASKATCHEWAN: Lipton, *Clokey* 1618.

ALBERTA: Craigmyle District, *Brinkman* in 1922.

MONTANA: Jefferson City, *Scribner* 338. Pony, *Rydberg & Bessey* 3550. Spanish Basin, *Rydberg* 3156.

WYOMING: Evanston, *Williams* 2421, 2438. Yellowstone Park, *Tweedy* 610; *Mearns* 1307, 2610, 2714; *Hitchcock* 2019. Jacksons Hole, *Merrill & Wilcox* 316. Antelope Basin, *Nelson* 7497. Laramie Hills, *Nelson* 417. Specimen Ridge, *Nelson & Nelson* 5886.

IDAHO: Victor, *Merrill & Wilcox* 210, 212. Picabo, *Macbride & Payson* 2960; St. Anthony, *Merrill & Wilcox* 127. Bear Lake, *Williams* 2559.
WASHINGTON: Spokane County, *Suksdorf* 8990, 8990b.
COLORADO: Gunnison, *Shear* 944. Black Canyon, *Baker* 118. Twin Lakes, *Wolfe* 1103. Mancos, *Baker, Earle & Tracy* 383. Veta Pass, *Clements* 122; *Shear* 821.
UTAH: Charleston Mountains, *Heller* 11020. Ely, *Hitchcock* 10838. Austin, *Hitchcock* 10639. Silver Reef, *Jones* 5149. Ephraim, *Tidestrom* 1260.
NEW MEXICO: Glorieta, *Vasey* in 1881. Without locality, *Fendler* 980.
ARIZONA: Grand Canyon, *Hitchcock* 10450; *MacDougal* 171; *Chase* 5805, 5817. Hell Canyon, *Rusby* 877.
CALIFORNIA: Redding, *Heller* 12334. Fallen Leaf Lake, *Eastwood* 1058. White Mountains, *Jepson* 7294.

12b. Stipa comata intonsa Piper.

Stipa comata intonsa Piper, Contr. U. S. Nat. Herb. **11**: 109. 1906. "Near Rockland, Klickitat County, *Suksdorf* 1026, type." The type collection is widely distributed.

DESCRIPTION.

Differing from *S. comata* in having pubescent foliage. Scarcely more than a form of that species.

DISTRIBUTION.

Dry sandy prairies, eastern Washington.
WASHINGTON: Rockland, *Suksdorf* 1026, 4447.

13. Stipa pulchra Hitchc.

Stipa pulchra Hitchc. Amer. Journ. Bot. **2**: 301. 1915. "Type specimen in the U. S. National Herbarium, no. 416,590, collected in a railroad cut three miles south of Healdsburg, Sonoma county, California, April 9, 1902, by A. A. Heller (no. 5252)."

This has usually been referred to *S. setigera* Presl [16] in works on California botany.

DESCRIPTION.

Culms glabrous, often pubescent below the nodes, sometimes scabrous below the panicle, erect or spreading at base, 60 to 100 cm. tall; sheaths glabrous or scaberulous, pubescent on the margin, a little pilose at the throat and on the collar; ligule about 1 mm. long; blades flat or involute, 1 to 2 mm. wide, glabrous beneath, scaberulous or pubescent on the upper surface, 10 to 20 cm. long; panicle open, 10 to 20 cm. long, the branches distant, slender, spreading, flexuous, scabrous or appressed-hispid, bearing 2 to several spikelets, often somewhat pilose at the axil; glumes about 1.5 cm. long, subequal, or the first a little longer, acuminate, 3-nerved, usually purplish, roughish on the nerves; lemma at maturity pale or rather dark, 8 to 10 mm. long, the callus sharp, about 2 mm. long, densely barbed with tawny hairs, the body minutely papillate-roughened, sparsely pubescent, especially along the back, sometimes glabrate toward the summit, constricted into a short neck scarcely 1 mm. long, the summit bearing a row of stiff erect hairs about 1 mm. long; awn 5.5 to 9 mm. long, twice-geniculate, rather easily deciduous, the first segment 1.5 to 2 cm. long, twisted, appressed-hispid, the second like the first, about 1 cm. long, the third straight and slender, scabrous; anthers tipped with a minute tuft of hairs. (Pl. 51, figs, 6, 7. *Chase* 5598.)

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[16] Presl. Rel. Haenk. 1: 226. 1830.

DISTRIBUTION.

Dry hills and deserts, central California to Lower California.

CALIFORNIA: San Diego, *Brandegee* 833; *Parish Brothers* 1550, 1554; *Pringle* in 1882. Capay Valley, *Lemmon* 5455. Healdsburg, *Heller* 5252. San Luis Obispo, *Jones* 3233; *Lemmon* 5472. Arroyo del Puerto, *Brewer* 1262. Santa Barbara, *Elmer* 3874, 3935; *Chase* 5598, 5622, 5636. Pacific Grove, *Elmer* 3507; *Chase* 5659; *Hitchcock* 2621. San Clemente Island, *Trask* 361. San Nicolas Island, *Trask* 16. Santa Catalina Island, *Knopf* 201. North Fork, *Griffiths* 4601. Marysville Buttes, *Heller* 11804. Ballona Harbor, *Abrams* 1185. Winchester, *Hall* 2921. Riverside, *Hall* 2977. Borax Lake, *Torrey* 579. Stony Creek, *Hansen* 1668. Sacramento Valley, *Hartweg* 2028. Playa del Rey, *Chase* 5549. Ventura, *Chase* 5589. San Bernardino, *Chase* 5527. Berkeley, *Chase* 5664. Mount Tamalpais, *Chase* 5670. Without locality, *Kellogg & Harford* 1096, *Bolander* 4802.

LOWER CALIFORNIA: Guadalupe Ranch, *Orcutt* in 1886.

14. **Stipa leiantha** Hitchc., sp. nov.

DESCRIPTION.

Culms erect, rather slender, glabrous, about 60 cm. tall; sheaths glabrous; ligule rather firm, 1 to 2 mm. long; blades involute, filiform, scabrous, 10 to 15 cm. long on the innovations, shorter on the culm; panicle narrow, few-flowered, 15 to 20 cm. long, the branches few, distant, appressed, the lower in pairs or threes, the shorter with one or two spikelets, the longer naked at base, with about 3 spikelets, the axis and branches smooth, the pedicels sometimes sparsely scabrous; glumes about equal, 7 to 8 mm. long, rather firm, glabrous, broad, abruptly acute or short-acuminate, purple below, tawny above, obscurely 3 to 5 nerved; lemma about 6 mm. long, the callus 1 mm. long, sharp, densely barbed with brown hairs as much as 2 mm. long, the body oblong, terete, glabrous, light brown (lighter than the callus), very minutely granulose or scaberulous near the slightly contracted summit; awn 1.5 to 2 cm. long, twice-geniculate, densely short-pilose to the second bend, the first segment about 7 mm. long. (Pl. 51, figs. 8, 9. *Hitchcock* 6489.)

Type in the U. S. National Herbarium, no. 993,443, collected on a rocky hill at Esperanza, State of Puebla, Mexico, altitude 2,600 meters, August 28, 1910, by A. S. Hitchcock (no. 6489).

Known only from the type specimen.

15. **Stipa pringlei** (Beal) Scribn.

Oryzopsis pringlei Beal, Bot. Gaz. **15**: 112. 1890. "No. 1410, C. G. Pringle, collected in Chihuahua, Mexico, 1887, and distributed as *Stipa Pringlei* Scribn." The type collection is widely distributed.

Stipa pringlei Scribn. in Vasey, Contr. U. S. Nat. Herb. **3**: 54. 1892. Based on *Oryzopsis pringlei* Beal.

DESCRIPTION.

Culms cespitose, erect, glabrous, sometimes puberulous about the nodes, mostly about 1 meter tall; sheaths glabrous; ligule about 2 mm. long, decurrent; blades flat or those of the innovations involute, firm, erect, scabrous, 10 to 30 cm. long, 1 to 3 mm. wide; panicle nodding, 10 to 15 cm. long, the branches ascending, few-flowered, naked below, the axis glabrous, the branchlets and pedicels slightly scabrous; glumes equal, about 1 cm. long, membranaceous, broad, rather abruptly narrowed into a short point, glabrous, the first about 9-nerved, the second about 7-nerved; lemma 7 to 8 mm. long, oblong-elliptic,

brown, villous with appressed brownish hairs, the surface also minutely papillate, the callus 1 mm. long, densely barbed, the abruptly narrowed summit with a dense ring of short brown hairs; awn about 2 cm. long, obscurely twice-geniculate, scabrous, twisted to the second bend. (Pl. 51, figs. 10, 11. *Hitchcock* 7681.)

DISTRIBUTION.

Rocky woods and slopes, New Mexico and Arizona to Chihuahua.

NEW MEXICO: Turkey Creek, *Metcalfe* 557. Queen, *Hitchcock* 13553.
ARIZONA: Huachuca Mountains, *Griffiths* 4836; *Mearns* 2573; *Pringle* in 1884. Rincon Mountains, *Nealley* 66. White Mountains, *Griffiths* 5298. Flagstaff, *Griffiths* 4976; *Tracy* 130. McKays Peak, *Wooton* in 1913. Chiricahua Mountains, *Lemmon* 4678; *Blumer* 1405. Santa Rita Mountains, *Griffiths & Thornber* 107; Williams, *Hitchcock* in 1903.
CHIHUAHUA: Sierra Madre, *Pringle* 1410. Sánchez, *Hitchcock* 7677, 7681.

16. Stipa eminens Cav.

Stipa eminens Cav. Icon. Pl. **5**: 42. *pl. 467. f. 1.* 1799. "Habitat prope oppidium mexicanum Chalma." The type, at the Madrid Botanical Garden, is labeled, "Chalma en Nueva-Espana. Née dedit." The lemma is 6 mm. long, the first segment of the awn is 5 mm., the second 5 mm., and the third 2 cm. The description states that the awn is an inch and one-half long, bent about the middle. The awn is twice-geniculate, but the first bend is rather obscure.

Stipa erecta Fourn. Mex. Pl. **2**: 75. 1886. Not *S. erecta* "Ht. Madr.;" Trin. 1824. The only specimen cited is "Tehuacán, (*Liebm.* n. 654)." The type specimen, bearing the name in Fournier's hand, is in the Copenhagen Herbarium. The lemmas are only 4.5 mm. long; the awn is a little over 2 cm. long.

Stipa flexuosa Vasey, Bull. Torrey Club **15**: 49. 1888. "G. C. Nealley, Western Texas." In the type, in the U. S. National Herbarium, the lemma is 5 mm. long, the awn 4.5 cm. long, the third segment 3.5 cm. long, the first bend obscure.

DESCRIPTION.

Culms slender, rather wiry, glabrous, 80 to 120 cm. tall; sheaths glabrous, short-villous at the throat; ligule 3 to 4 mm. long or even 6 mm. long on the culm leaves, about 1 mm. long on the innovations; blades flat or involute, glabrous or scaberulous, as much as 35 cm. long, 1 to 4 mm. wide; panicle open, 10 to 20 cm. long, usually densely pilose on the lower node, sometimes at the others, the branches slender, scabrous, spreading, often flexuous, usually 3 or 4, or even more, at a node, the lowermost 5 to 8 cm. long; glumes about 1.5 cm. long, the first a little longer, pale, 3-nerved, long-acuminate, glabrous; lemma pale, 5 to 7 mm. long, the callus 1 to 2 mm. long, densely barbed with white hairs, the body broadest about one-third from the callus, villous all over, narrowed above into an obscure neck; awn 3 to 6 cm. long, obscurely twice-geniculate, the first segment scabrous-hispid, twisted, about as long as the lemma, the second similar, a little shorter, the third flexuous, scabrous, not twisted. (Pl. 51, figs. 12, 13. *Palmer* 523.)

DISTRIBUTION.

Rocky hills, Texas to Arizona and south to central Mexico.

TEXAS: Presidio County, *Nealley* 155.
NEW MEXICO: Kingston, *Metcalfe* 1330. Organ Mountains, *Wooton* 1070; *Hitchcock* 3768; *Standley* in 1906. Without locality, *Wright* 1998; *Emersley* 31.
ARIZONA: Camp Grant, *Rothrock* in 1874.
SONORA: Fronteras, *Hartman* 20.

CHIHUAHUA: Santa Eulalia Mountains, *Pringle* 384; *Wilkinson* in 1885.
DURANGO: Durango, *Palmer* 523 in 1896; *Hitchcock* 7624.
ZACATECAS: Zacatecas, *Hitchcock* 7524; *Pringle* 2043. Hacienda de Cedros, *Lloyd* 187, 212.
SAN LUIS POTOSÍ: San Luis Potosí, *Hitchcock* 5671; *Parry & Palmer* 929.
QUERÉTARO: San Juan del Río, *Rose, Painter & Rose* 9581.
HIDALGO: Sierra de la Mesa, *Rose, Painter & Rose* 9099. Pachuca, *Hitchcock* 6700. Tula, *Rose, Painter & Rose* 8362.
MEXICO: Río Hondo, *Pringle* 6228.
FEDERAL DISTRICT: *Bourgeau* 669; *Hitchcock* 7837; *Pringle* 9564.
PUEBLA: Tehuacán, *Pringle* 6766; *Hitchcock* 6079. Chalchicomula, *Hitchcock* 6274. Esperanza, *Hitchcock* 6486; *Pittier* 443.

17. **Stipa clandestina** Hack.

Stipa clandestina Hack. Repert. Nov. Sp. Fedde **8**: 516. 1910. "Mexico. Prope Michoacan leg. Fr. Arsène (no. 3441). Prope Saltillo in circ. Coahuila leg. E. Palmer, no. 3 (Apr. 1898)." These specimens have been examined in the Hackel Herbarium. The first cited may be taken as the type. In the U. S. National Herbarium is a specimen of this species collected by Brother Arsène (no. 3441), but it is from Saltillo. The Palmer collection also is in the U. S. National Herbarium.

DESCRIPTION.

Culms erect, glabrous, 50 to 80 cm. tall, the whole plant pale green; sheaths glabrous, hispid at the throat, the lower often concealing cleistogamous panicles; ligule a membrane about 1 mm. long or less, ciliate with stiff hairs 1 to 2 mm. long; blades folded or involute or the older lower ones flat, rather firm, glabrous, subulate-pointed, 10 to 20 cm. long, 1 to 2 mm. or even as much as 4 mm. wide; panicle narrow, pale, rarely purplish, 10 to 20 cm. long, often more or less inclosed in the uppermost sheath, the branches in distant fascicles, ascending or appressed, naked below, bearing several spikelets above, the axis glabrous, densely pilose at the lowermost node, more or less pilose at the other nodes; glumes equal, about 8 mm. long, papery, broad, abruptly acuminate, 3-nerved, scaberulous on the nerves and somewhat so between the nerves; lemma fusiform, pale, about 6 mm. long, the callus about 1 mm. long, densely barbed with white hairs, the body densely white-villous below, glabrate in streaks above, narrowed toward summit, this ciliate with stiff erect hairs 1 mm. long; awn 11 to 18 cm. long, twice-geniculate, almost smooth, scaberulous on the angles only, slightly twisted to the second bend, the first and second segments each 3 to 5 mm. long. (Pl. 51, figs. 14, 15. *Arsène* 3441.)

The Colombian specimens differ slightly in having a nearly glabrous ligule, in being scarcely pilose on the lower nodes of the panicle axis, and in being less pilose at the summit of the fruit. The plants appear to be more lax. They may belong to a distinct species.

DISTRIBUTION.

Dry open ground, northern Mexico; also in Colombia.

COAHUILA: Saltillo, *Nil* in 1909; *Arsène* 3441, 3467; *Nicolas* in 1909; *Palmer* 3 in 1898; *Hitchcock* 5579.
COLOMBIA: Tierra Adentro, State of Cauca, *Pittier* 1334, 1438.

18. **Stipa lepida** Hitchc.

Stipa lepida Hitchc. Amer. Journ. Bot. **2**: 302. 1915. "Type specimen in the U. S. National Herbarium, no. 733,683, collected on an open hillside in the Santa Ynez Forest Reserve, Santa Barbara County, California, April 19, 1910, by Agnes Chase (no. 5611)."

This species has been referred in California floras to *S. eminens* Cav.

DESCRIPTION.

Culms cespitose, often in large bunches, erect or spreading at base, glabrous or scaberulous, or the lower internodes pubescent, the upper ones sometimes puberulent below the nodes; sheaths glabrous, sometimes a little roughened, slightly villous at the throat; ligule very short, less than 1 mm. long; blades flat or soon involute, rather lax, glabrous or scaberulous beneath, pubescent on upper surface, 10 to 30 cm. long, 1 to 2 or even as much as 4 mm. wide; panicle open, nodding, 10 to 20 cm. long, the branches single, in pairs, or in clusters, ascending or more or less spreading, slender, scabrous, naked below (or with some short branches in the cluster), 5 to 8 cm. long, or sometimes longer, branching about the middle, bearing several or many pale or sometimes purplish spikelets, the branchlets appressed; glumes 6 to 8 mm. long, equal or the first a little longer, narrow, acuminate, glabrous, 3-nerved, lemma 4.5 to 5.5 mm. long, the callus less than 1 mm. long, barbed with white hairs, the body tapering from below the middle to the summit, brown at maturity, sparsely villous all over with white hairs or glabrate toward summit, the neck short and obscure, the summit with several short stiff appressed hairs; awn obscurely twice-geniculate, scaberulous, very slender, loosely twisted to the second bend, mostly 2.5 to 3.5 cm. long; anthers tipped with a minute tuft of hairs. (Pl. 51, figs. 16, 17. *Chase* 5609.)

DISTRIBUTION.

Dry hills, open woods, and rocky slopes, central California to Lower California.

CALIFORNIA: Santa Ynez Forest, *Chase* 5608, 5609, 5611, 5634, 5637. Oakland Hill, *Kellogg & Harford* 1095. Chico Meadows, *Heller* 11501. Los Angeles, *Grant* 2971; *Piper* 6291, 6300, 6310; *Chase* 5559. Santa Clara County, *Heller* 8548; *Hitchcock* 2674. Pasadena, *Jones* 3544. Chollas Valley, *Orcutt* 1065. San Bernardino, *Parish Brothers* 870; *Chase* 5535. Santa Catalina Island, *Trask* in 1901. Southern California, *Perry & Lemmon* 20.

LOWER CALIFORNIA: Cedros Island, *Palmer* 661 in 1889.

18a. Stipa lepida andersoni (Vasey) Hitchc.

Stipa eminens var. *andersoni* Vasey, Contr. U. S. Nat. Herb. **3**: 54. 1892. "Lower California (Dr. Anderson, Dr. Hasse, Allen, and others)." The type, in the U. S. National Herbarium, was collected at Santa Cruz by C. L. Anderson in 1888 (no. 58). The locality, "Lower" California as given by Vasey is an error. The specimens collected by Hasse, Allen, and others, examined by Vasey, are all from southern California and not from Lower California.

Stipa hassei Vasey, Contr. U. S. Nat. Herb. **1**: 267. 1893. "Dry ridges near Santa Monica, California. Type specimen collected in 1891 by Dr. H. E. Hasse, for whom it is named. It is nearly related to *Stipa eminens* [*S. lepida*] variety *andersoni* Vasey, which is found in the same region." The type is in the U. S, National Herbarium. The spikelets are distorted by a smut.

Stipa lepida andersoni Hitchc. Amer. Journ. Bot. **2**: 303. 1915. Based on *S. eminens andersoni* Vasey.

DESCRIPTION.

Differing only in the more slender culms, the slender involute blades, and the narrow or reduced panicle. Scarcely a distinct variety.

DISTRIBUTION.

Dry or rocky hills, central and southern California.

CALIFORNIA: Ventura, *Chase* 5590. Santa Monica, *Hasse* in 1892. Santa Cruz Island, *Brandegee* in 1888. Santa Cruz Mountains, *Lemmon* 5452. Berkeley, *Davy* 4235; *Chase* 5667. Santa Catalina Island, *Nuttall* 115, 336. Walker Valley, *Davy & Blasdale* 5040. Dunlap to Millwood, *Griffiths* 4653.

19. Stipa porteri Rydb.

Stipa porteri Rydb. Bull. Torrey Club **32**: 599. 1905. Based on *Stipa mongolica* as described by Porter and Coulter,[17] not *S. mongholica* Turcz. The only specimen mentioned by Porter and Coulter is *Hall & Harbour* 648. *Stipa mongolica* is mentioned earlier [18] in Gray's enumeration of plants collected by Hall and Harbour. The number of the specimen is given as 646, that cited by Porter and Coulter being an error, as shown by the number found on the Hall and Harbour collection. *Hall & Harbour* 646 is therefore the type collection of *Stipa porteri*.

Beal,[19] in transferring *Stipa mongolica* to *Oryzopsis*, probably had the Hall and Harbour plant in mind.

DESCRIPTION.

Culms erect, glabrous, mostly 20 to 35 cm. tall, exposing one node above the basal leaves; sheaths glabrous; ligule rather firm, 2 to 3 mm. long, that of the basal leaves a little shorter, oblong, somewhat 2-lobed, glabrous or minutely puberulent, the uppermost clasping the culm; blades involute, sulcate, scaberulous, slender, less than 1 mm. wide when rolled, 2 to 12 cm. long, the uppermost 2 to 4 cm. long; panicle open, mostly 5 to 8 cm. long, the branches mostly in pairs, slender, flexuous, 1 to 3 cm. long, unbranched or branched about the middle, sometimes again branched, the lowermost pair 2 to 2.5 cm. distant, the others a little closer, the main axis and the branches glabrous, the pedicels sparsely pilose below the spikelets; glumes equal, elliptic, broad and thin, obtuse, somewhat notched, about 5 mm. long, more or less purple-tinged, glabrous below, scaberulous at the tip and finely ciliate-fringed or pubescent at the apex, faintly 5-nerved; lemma about 5 mm. long including the rather blunt, densely pilose callus about 0.5 mm. long, softly pilose with appressed hairs on the lower half, scaberulous only above, faintly nerved, lobed at summit, the tips of the lobes and of the palea finely pubescent like the glumes, the palea about as long as the lemma; awn 12 to 15 mm. long, with a single bend one-third from the base, the first segment weakly twisted, plumose with hairs 1 to 2 mm. long, the second segment untwisted, 8 to 10 mm. long, pubescent with appressed hairs. (Pl. 51, figs. 18, 19. *Wolfe* 1109.)

This species is closely allied to *Stipa mongolica* Turcz. of central Asia. It differs in the pilose pedicels, the shorter spikelets and awns, and the less villous lemma.

DISTRIBUTION.

High mountains of Colorado.

COLORADO: Twin Lakes, *Wolfe* 1109. Without locality, *Hall & Harbour* 646; *Vasey, Powell's Expedition*, in 1868.

20. Stipa thurberiana Piper.

Stipa thurberiana Piper, U. S. Dept. Agr. Div. Agrost. Circ. **27**: 10. 1900. "*S. occidentalis* Thurb. in Wilkes, U. S. Explor. Exped. **17**: 483. 1874, not U. S. Geol. Explor. 40th Par. **5**: 380. 1871." This species had been confused with *S. occidentalis*. The species described by Thurber in the first work cited, being different from the one he described under the same name in the second work, was distinguished by Piper as *S. thurberiana*. The locality cited is "North branch of the Columbia and Okanagan." The type specimen was collected by Pickering and Brackenridge. A duplicate type is in the U. S. National Herbarium.

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[17] Syn. Fl. Colo. 145. 1874.
[18] Proc. Acad. Phila. **1863**: 79. 1863.
[19] Bot. Gaz. **15**: 111. 1890.

DESCRIPTION.

Culms densely cespitose, slender, erect, scabrous, sometimes hispidulous or puberulous below the nodes, mostly 30 to 60 cm. tall, about 2-noded; sheaths scaberulous or the upper glabrous; ligule thin and hyaline, 2 to 5 mm. long, decurrent; blades slender, involute, scabrous beneath, scaberulous-pubescent on the upper surface, flexuous, about 0.3 mm. thick when rolled, 10 to 25 cm. long, the uppermost 3 to 5 cm. long; panicle narrow, mostly 8 to 15 cm. long, somewhat nodding, the axis and branches scaberulous, the branches ascending, mostly in pairs, one short, the other 5 to 8 mm. long, bearing a single spikelet or the lowermost sometimes with more, the pedicel thickened below the spikelet; glumes 11 to 13 mm. long, nearly equal, the second a little shorter, thin, often purple, the upper part hyaline, gradually narrowed to a soft point, glabrous or minutely scaberulous, or the first minutely pubescent along the margins, 3-nerved; lemma 8 to 9 mm. long, gradually narrowed from below the middle, pale, appressed-pubescent, the sharp callus about 1 mm. long, the pubescence about the same as on the body; awn 4 to 5 cm. long, twice-geniculate, the second bend rather obscure, the first and second segments about 1 cm. long, twisted, plumose with ascending white hairs 1 to 2 mm. long, the second segment less densely plumose than the first, the third slightly twisted, scabrous. (Pl. 51, figs. 20, 21. *Chase* 4689.)

DISTRIBUTION.

Mesas and rocky slopes, Idaho and Washington to central California.

IDAHO: Picabo, *Macbride & Payson* 2962, 2972. Jerome, *Chase* 4689. Mountain Home, *Chase* 4719. Shoshone, *Saunders* 2930.

WASHINGTON: Coulee City, *Piper* 3919. Bickleton, *Suksdorf* 94. North Yakima, *Henderson* 2255. Spokane, *Piper* 2613. Ellensburg, *Piper* 2611. Douglas County, *Sandberg & Leiberg* 269. Yakima, *Griffiths & Cotton* 48, 50. Wenatchee, *Griffiths & Cotton* 144; *Whited* 1230. Ephrata, *Griffiths & Cotton* 477. Prosser, *Griffiths & Cotton* 13.

OREGON: Baker, *Eggleston* 12611. Laidlaw, *Whited* 56, 3200. Poison Creek, *Eggleston* 7143. Powder River, *Cusick* 1154. Snake River, *Cusick* 1320. Cathro Valley, *Griffiths & Hunter* 308. Malheur County, *Leiberg* 2086, 2289. Long Creek, *Griffiths & Hunter* 134. Bedes Buttes, *Griffiths & Hunter* 354. Crook County, *Leiberg* 215.

NEVADA: Reno, *Hitchcock* 10558, 10561; *Tracy* 243. Austin, *Hitchcock* 10620, 10632. Palisade, *Jones* 4110. Without locality, *Wheeler* in 1872.

CALIFORNIA: Modoc Forest Reserve, *Hatton* in 1911. Yreka, *Butler* 1271.

21. **Stipa elmeri** Piper & Brodie.

Stipa viridula pubescens Vasey, Contr. U. S. Nat. Herb. **3**: 50. 1892. Not *S. pubescens* R. Br., 1810. "Nevada, Oregon, and Washington." No specimen or definite locality is cited. A sheet in the U. S. National Herbarium, upon which Vasey has written the name, is accepted as the type. This was collected in Washington by Suksdorf on dry ground along the Columbia River in 1883. The culms are 75 cm. tall, rather robust.

Stipa elmeri Piper & Brodie, Scribn. U. S. Dept. Agr. Div. Agrost. Bull. **11**: 46. 1898. Based on *Stipa viridula pubescens* Vasey.

DESCRIPTION.

Culms erect, puberulent, 50 to 100 cm. tall, 2 or 3-noded; sheaths pubescent; ligule a membrane less than 1 mm. long; blades of the culm mostly flat, becoming involute, 15 to 30 cm. long, 2 to 4 mm. wide, pubescent on both surfaces, the uppermost shorter, those of the innovations slender, involute; panicle narrow,

dense or somewhat interrupted, 10 to 20 cm. long, the branches short and appressed, the pedicels sometimes pubescent; glumes nearly equal, about 12 mm. long, pale, thin, tapering to a fine soft point, minutely scaberulous, 3-nerved; lemma about 6 to 7 mm. long, dark brown, rather sparsely appressed-pubescent, widest about the middle, the callus a little over 1 mm. long, densely bearded with yellowish hairs; awn 3.5 to 5 cm. long, twice-geniculate, the first segment 1 cm. long, twisted, plumose with ascending hairs about 1 mm. long, the second like the first, slightly shorter, less plumose toward the tip, the third straight, scabrous. (Pl. 51, figs. 22, 23. *Hitchcock* 3336.)

DISTRIBUTION.

Dry hills, sandy plains, and open woods, Washington to California and Nevada.

IDAHO: Coeur d'Alene, *Rust* 347.

WASHINGTON: Spokane, *Turesson* 21; *Piper* 2276, 2601; *Chase* 4985. Ellensberg, *Piper* 2583. Chelan, *Elmer* 487. Spokane County, *Suksdorf* 8989. Steamboat Rock, *Griffiths & Cotton* 441.

OREGON: Laidlaw, *Whited* 3071. Without locality, *Cusick* 1156.

NEVADA: Empire City, *Jones* 4109. Glenbrook, *Hitchcock* 3190. Kings Canyon, *Baker* 1285.

CALIFORNIA: San Jacinto Mountains, *Hall* 2537. Goose Valley, *Eastwood* 922. Fallen Leaf Lake, *Eastwood* 1063. Dunlap, *Griffiths* 4680. Yosemite National Park, *Hitchcock* 3247, 3336. Yosemite Valley, *Jepson* 4280. Mount Tallac, *Hitchcock* 3124. San Bernardino County, *Parish* 2491. Stanislaus Forest, *Eggleston* 9504.

22. **Stipa occidentalis** Thurb.

Stipa occidentalis Thurb.; S. Wats. in King, Geol. Expl. 40th Par. **5**: 380. 1871. "Yosemite Trail, California (5038 Bolander). Pah-Ute Range, Nevada; 5,000 feet altitude; June (1,296 [Watson])." Duplicates of both cited specimens are in the U. S. National Herbarium. The first, *Bolander* 5038, may be considered the type. In both specimens the third segment of the awn is appressed-pilose.

Stipa stricta Vasey, Bull. Torrey Club **10**: 42. 1883. Not *S. stricta* Lam. 1791. "Oregon, W. N. Suksdorf, and through the Sierra Nevada Mountains." Dr. Vasey is differentiating this from what was later described as *S. thurberiana* and which he assumed was the true *S. occidentalis*. The type, in the U. S. National Herbarium, collected in 1882 in "Washington Terry," bears the name in Vasey's hand. The published locality, Oregon, is an error.

Stipa stricta sparsiflora Vasey, Contr. U. S. Nat. Herb. **3**: 51. 1892. "California (Bolander, No. 5038 and 5020), Oregon (*Cusick*) and Washington (*Suksdorf*)." Dr. Vasey has written the name upon two sheets in the U. S. National Herbarium, *Bolander* 5038 and *Bolander* 5020. The two specimens are alike, but the first may be selected as the type.

Stipa oregonensis Scribn. U. S. Dept. Agr. Div. Agrost. Bull. **17**: 130. *f. 426*. 1899. "*S. stricta* Vasey, not Lam." A new name for *S. stricta*, which is a homonym.

Stipa occidentalis montana Merr. & Davy, Univ. Calif. Publ. Bot. **1**: 62. 1902. "*Stipa occidentalis* Thurber, U. S. Geol. Expl. 40th Par. V. 380 (1871), in part." "Yosemite Trail, on loose, disintegrated granite, Aug. 20, 1866 (Dr. H. N. Bolander, No. 5038; type)." From Merrill's discussion it appears that he considers the type of *S. occidentalis* to be the second specimen cited, Watson 1296 from Pah-Ute Mountains, because Watson's description of the awn "densely pilose below, scabrous above" applies best to this. In both the specimens cited

the third segment of the awn is appressed-pilose, but in the second specimen, because of being glued to the sheet, the hairs are obscured.

The confusion in regard to *S. occidentalis* arose because Thurber described two species under this name. The first (in 1871), as cited above, having a short ligule, retains the name. The second, having a long ligule, was described later.[20] Vasey recognized this difference between the two species but renamed the one published first, calling it *S. stricta*, retaining *S. occidentalis* for the other. Piper set things straight by naming the second one *S. thurberiana*.

DESCRIPTION.

Culms cespitose, erect, glabrous, about 2-noded, mostly 25 to 40 cm. tall; sheaths glabrous; ligule a membrane about 0.5 mm. long; blades erect, flat or usually involute, glabrous beneath, scabrous-puberulent on the upper surface, 10 to 20 cm. long, 1 to 2 mm. wide when flat; panicle narrow, 10 to 20 cm. long, the branches appressed, 1 to 2 cm. long, mostly in unequal pairs, the pedicels glabrous; glumes about 12 mm. long, nearly equal, pale, hyaline, tapering to a fine soft point, faintly 3-nerved; lemma pale brown, about 7 mm. long, rather sparsely appressed-pubescent, widest about the middle, the callus a little over 1 mm. long, rather sparsely barbed, the sharp point naked; awn 3 to 4 cm. long, twice-geniculate, the first and second segments 7 to 10 mm. long, twisted, plumose with ascending hairs about 1 mm. long, the hairs of the second segment a little shorter, the third segment slender, untwisted, appressed-pilose below, naked toward summit or scabrous throughout. (Pl. 51, figs. 24, 25. *Hitchcock* 11740.)

Hitchcock's no. 10475 from Truckee, California, is puberulous on culms, sheaths, and blades, and is taller than usual for the species (about 70 cm.), thus resembling *S. elmeri*, but the measurements for the awns are like those of *S. occidentalis*.

DISTRIBUTION.

Plains, rocky hills, and open woods, Wyoming to Washington and California.

WYOMING: Yellowstone National Park, *Hitchcock* 1870, 2109; *Merrill* 138; *Letterman* 99; *Nelson* 6592. Albany County, *Nelson* 457. Teton Forest Reserve, *Merrill & Wilcox* 420. Jacksons Hole, *Merrill & Wilcox* 357, 358.

IDAHO: Divide between Salmon and Payette rivers, *Henderson* 3081. St. Anthony, *Merrill & Wilcox* 147.

WASHINGTON: Chiwankum Lake, *Eggleston* 13591. Sunnyside, *Cotton* 487. Yakima County, *Henderson* 2257; *Cotton* 1457. Klikitat County, *Cotton* 1559. Kittitas County, *Cotton* 1675, 1755. Stehekin, *Griffiths & Cotton* 21a. Falcon Valley, *Suksdorf* 6240.

OREGON: Silvies River, *Griffiths & Hunter* 192. Mount Hood, *Hitchcock* 11740. *Henderson* 1282. Crook County, *Coville & Applegate* 601; *Leiberg* 560. Goose Creek, *Cusick* 2241. Izee, *Griffiths & Hunter* 203. Swan Lake Valley, *Applegate* 3133. Bald Knob, *Sampson & Pearson* 99. Crater Lake, *Hitchcock*, 3036. Brokentop Mountain, *Coville & Applegate* 565. Steins Mountains, *Griffiths & Morris* 604. Fort Klamath, *Hitchcock* 3009. Wallowa Mountains, *Cusick* 3196.

NEVADA: Franktown, *Heller* 10528. Mount Rose, *Kennedy* 983. Steins Mountains, *Griffiths & Morris* 554. Virginia City, *Bloomer* 2261. Gold Creek, *Hitchcock* 10772. Park Station, north of Elko, *Hitchcock* 10730. Austin, *Hitchcock* 10663. Pah-Ute Mountains, *Watson* 1296.

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[20] In Wilkes, U. S. Expl. Exped. 17: 483. 1874.

CALIFORNIA: Siskiyou County, *Heller* 11427. Mount Goddard, *Hall & Chandler* 708. Mariposa trail, *Bolander* 5020. Truckee, *Hitchcock* 10475, 10476. Mount Whitney, *Jepson* 5056. Upper Kern River, *Hall & Babcock* 5311. Summit Valley, *Pringle* in 1882. Tulare County, *Palmer* 232 in 1888. Mount Shasta, *Pringle* in 1881; *Baker* 3896; *Hitchcock* 2938. San Jacinto Mountains, *Hall* 2325; *Reed* 2395. Bear Valley, *Abrams* 2101. Kaweah Peak, *Purpus* 1558. Black Mountain, *Hall & Chandler* 585. Ventura, *Elmer* 3815. San Bernardino Mountains, *Parish* 3288. Yosemite Trail, *Bolander* 5038. Yosemite National Park, *Hitchcock* 3245, 3272, 3335. Lake Valley, *Abrams* 4775. Lake Merced, *Jepson* 3189. Mount Wilson, *Abrams* 2598. Tahoe, *Hitchcock* 3114. Kings River, *Lemmon* in 1902. Sequoia National Forest, *Hitchcock* 3415, 3433, 3462. Mount Tallac, *Hitchcock* 3141.

23. **Stipa multinodis** Scribn.

Stipa multinodis Scribn.; Beal, Grasses N. Amer. **2**: 222. 1896. "Mexico, *Pringle* 385 in 1885." The type, in the herbarium of the Michigan Agricultural College, bears the name, with Scribner as author, in Beal's script. The duplicate types are widely distributed. In the U. S. National Herbarium is a specimen of the type collection from the Scribner Herbarium which is labeled in Scribner's hand, *Stipa multinodis* Scribn., n. sp.

DESCRIPTION.

Culms erect, firm and wiry, glabrous, several-noded, 60 to 100 cm. tall, usually bearing a few appressed branches at the middle nodes; sheaths glabrous, overlapping; ligule less than 1 mm. long; blades flat, stiff and firm, becoming involute especially toward the end, scabrous, 10 to 30 cm. long, 1 to 3 mm. wide; panicle narrow, pale, 10 to 20 cm. long, the branches distant, several at a node, appressed or ascending, slender, rather stiff, short and long intermixed, the longer as much as 6 cm. long, naked at base; glumes about 9 mm. long, nearly equal, pale and hyaline, acuminate, glabrous, scarcely nerved on the sides; lemma pale, narrow, about 5 mm. long, the callus about 0.5 mm. long, barbed with tawny hairs, the body densely pubescent with tawny or white appressed hairs, narrowed into a short obscure neck, the upper hairs extending upward past the summit for about 0.5 mm.; awn 2.5 to 3 cm. long, twice-geniculate, the first two segments twisted, scabrous-pubescent, about 6 mm. long, the third scabrous, straight. (Pl. 51, figs. 26, 27. *Pringle* 385.)

DISTRIBUTION.

Rocky hills, northern Mexico.

CHIHUAHUA: Santa Eulalia Mountains, *Pringle* 385. Santa Eulalia Plains, *Wilkinson* 349.

COAHUILA: Saltillo, *Hitchcock* 5617.

24. **Stipa constricta** Hitchc., sp. nov.

DESCRIPTION.

Culms somewhat decumbent at base, glabrous, several-noded, about 80 cm. tall, bearing appressed branches below the middle; sheaths glabrous; ligule rather prominent, 3 to 5 mm. long; blades loosely involute, glabrous, or scaberulous toward the tip, 5 to 15 cm. long, 1 to 2 mm. wide; panicle narrow, purplish, 10 to 20 cm. long, the branches ascending, slender, naked at the base, several-flowered, the pedicels scabrous-pubescent; glumes about 8 mm. long, equal, narrow, acuminate to a fine point, 3-nerved; lemma narrow, 6 mm. long, the callus nearly 1 mm. long, densely barbed with white hairs, the body narrowly

fusiform, narrowed above into a neck about 1 mm. long, dull brown, appressed-villous all over with white hairs, more sparsely above, the summit ciliate with a few erect hairs 1.2 to 1.4 mm. long; awn scabrous, twice-geniculate, mostly 2 to 2.5 cm. long, the first two segments less than half the entire length. (Pl. 51, figs. 28, 29. *Hitchcock* 6742.)

Type in the U. S. National Herbarium, no. 993345, collected on a rocky hill at 2,400 meters altitude, Pachuca, Hidalgo, Mexico, September 7, 1910, by A. S. Hitchcock (no. 6742).

No other specimens have been seen. The species resembles *S. multinodis* in having several nodes and in the branching habit, but differs in the prominent ligule and in the longer lemma with more constricted summit.

25. Stipa scribneri Vasey.

Stipa scribneri Vasey, Bull. Torrey Club **11**: 125. 1884. "Collected on dry hillsides at Santa Fe, New Mexico." The type, in the U. S. National Herbarium, is a pale plant, about 60 cm. tall, with flat blades 3 mm. wide and panicles 20 cm. long.

DESCRIPTION.

Culms erect, glabrous, sometimes puberulent below the nodes, 30 to 70 cm. tall; sheaths glabrous, villous at the throat; ligule less than 1 mm. long; blades flat, involute toward the tip or sometimes involute to base, glabrous, scaberulous on the upper surface, 15 to 25 cm. long, 2 to 4 mm. wide; panicle narrow, rather compactly flowered, 10 to 25 cm. long, pubescent at the nodes, the branches fascicled, appressed, some short and some as much as 5 cm. long, the shorter ones bearing 1 or 2 spikelets, the longer ones naked at base and bearing several spikelets; glumes 10 to 15 mm. long, about equal or the first longer, pale, long-acuminate, scaberulous, 3-nerved; lemma about 8 mm. long, pale, the callus 1 mm. long, barbed with tawny hairs, the body narrow-fusiform, villous, the hairs white, on the lower part short and appressed, on the upper part ascending, as much as 2 mm. long, more dense at the summit; awn 14 to 20 cm. long, twice-geniculate, scabrous, twisted to the second bend, the first and second segments 3 to 5 mm. each, the third straight. (Pl. 51, figs. 30, 31. *Vasey*.)

Hitchcock's no. 10733, from Lone Mountain, Nev., is densely cespitose with slender wiry culms, 20 cm. tall, and slender closely involute blades.

DISTRIBUTION.

Mesas and rocky slopes, Colorado to Nevada and Texas.

TEXAS: Without locality, *Nealley*.

COLORADO: Georgetown, *Jones* 488. Boulder, *Letterman* in 1885. Royal Canyon, *Clements* 275. Golden, *Rydberg* 2507. Mount Blanco, *Shear* 88f Manitou, *Hitchcock* 1788. Salida, *Tracy* 474. Trinidad, *Shear* 16. Canyon City, *Shear* 970. Twin Lakes, *Clements* 319. Georgetown, *Shear* 641. Raton Mountains, *Griffiths* 5451. Empire, *Patterson* 273. Trail Glen, *Clements* 76.

NEVADA: Lone Mountain, 25 miles north of Elko, *Hitchcock* 10733. Karshaw, *Goodding* 976.

NEW MEXICO: Queen, *Hitchcock* 13502. Santa Fe, *Vasey* in 1884. Ute Park, *Standley* 14595. Organ Mountains, *Hitchcock* 3773. Cloudcroft, *Hitchcock* 13277, 13296. Ruidoso Creek, *Wooton* in 1905. Gallinas Canyon, *Wooton* in 1910. Cimarron Canyon, *Griffiths* 5565.

ARIZONA: Grand Canyon, *Hitchcock* 10448.

26. Stipa californica Merr. & Davy.

Stipa californica Merr. & Davy, Univ. Calif. Publ. Bot. 1: 61. 1902. "Type specimen collected by H. M. Hall, no. 2556, north side Fullers Ridge, San Jacinto Mountains, Southern California, July, 1901, 2,100 meters (7,000 ft.) alt." The type, in the U. S. National Herbarium, bears the additional datum, "West fork of Snow Creek."

DESCRIPTION.

Culms erect, glabrous or slightly roughened or puberulent below, 2 or 3-noded, 75 to 125 cm. tall, sometimes taller; sheaths glabrous or the lower puberulent, ciliate on one margin, slightly villous at the throat; ligule rather firm, puberulent, 1 to 2 mm. long, decurrent; blades flat, becoming involute, rather firm, glabrous beneath, scabrous on upper surface, 10 to 20 cm. long, 1 to 4 mm. wide, those of the innovations slender and involute; panicle narrow, rather slender, pale, 15 to 30 cm. long, the branches appressed, the axis glabrous; glumes about 1 cm. long, equal, pale, hyaline, gradually acuminate, 3-nerved, glabrous; lemma 6 to 7 mm. long, rather sparsely villous with ascending white hairs 1.5 mm. long, the callus about 1 mm. long, barbed; awn 2.5 to 3.5 cm. long, twice-geniculate, the first segment 7 mm. long, twisted, villous with ascending hairs about 0.5 mm. long, the second slightly shorter and a little less villous than the first, the third straight, slender, naked. (Pl. 51, figs. 32, 33. *Hall* 2556.)

DISTRIBUTION.

Dry open ground, Washington to California.

WASHINGTON: Spokane County, *Suksdorf* 9011. Hood, *Suksdorf* 10661.
OREGON: Hood River, *Hitchcock* 2744. Crater Lake, *Heller* 12586.
NEVADA: Hunter Creek Canyon, Reno, *Hitchcock* 10582.
CALIFORNIA: Weed, *Hitchcock* 3062. El Dorado County, *Heller* 12535. Mount Shasta, *Congdon* in 1900; *Hitchcock* 2934, 2936, 2948. Castle Crag, *Hitchcock* 3064. McCloud, *Eastwood* 1131. Harden Lake, *Eastwood* 224, 257. Siskiyou County, *Heller* 7936. Mount Tallac, *Hitchcock* 3121, 3159. Yosemite National Park, *Bolander* 6099, 6109; *Hall & Babcock* 3336; *Abrams* 4469. Wawona, *Congdon* in 1897. Soda Springs, *Kennedy & Doten* 247. San Jacinto Mountains, *Hall*, 2556. Donner Lake, *Torrey* 578. Truckee, *Hitchcock* 10515. Lake Tahoe, *Hitchcock* 3101.

27. Stipa angustifolia Hitchc., sp. nov.

Culms slender, glabrous, 10 to 30 cm. tall; sheaths glabrous, naked at the throat, the old basal ones flat; ligule of the culm leaves 1 to 2 mm. long, of the innovations shorter; blades involute, slender, rather lax and flexuous, glabrous, 10 to 20 cm. long, scarcely 0.5 mm. thick; panicle narrow, pale, rather loose or lax, the branches ascending or appressed, the lowermost as much as 5 cm. long, usually with one or two shorter branches at the base, the lower node of the main axis sometimes a little villous or hispidulous; glumes about 6 mm. long; nearly equal, green in the center and hyaline on the edges, broad, abruptly acuminate, 5-nerved; lemma medium brown, about 5 mm. long, the callus broad, a little less than 1 mm. long, densely barbed with brown hairs, the body oblong, 1 mm. wide, abruptly and asymmetrically contracted at summit, villous all over with ascending brown hairs about 1 mm. long, these sometimes less dense toward the summit, the summit densely ciliate with hairs nearly 1 mm. long; awn 10 to 15 mm. long, twice-geniculate, very minutely scaberulous, twisted to second bend; palea as long as the lemma; anthers without hairs at the tip. (Pl. 52, figs. 1, 2. *Palmer* 726.)

Type in U. S. National Herbarium, no. 570,290, collected among rocks on summit of Sierra de la Puebla, near Saltillo, Coahuila, Mexico, July 25, 1905, by Edward Palmer (no. 726).

The specimens of the type collection are the only ones known.

28. Stipa virescens H. B. K.

Stipa virescens H. B. K. Nov. Gen. & Sp. 1: 126. 1816. "Crescit in subfrigidis regni Mexicani, prope St. Rosa et Cuesta de Belgrado; item in radicibus montis porphyritici La Buffa, juxta Guanajuato, inter 1069 et 1240 hexap." At the Paris Herbarium is the second specimen cited, labeled "In subfrigidis Regni Mexicani, Guanaxuato, alt. 1069–1240 hex." The first specimen could not be found.

Stipa caerulea Presl, Rel. Haenk. 1: 227. 1830. "Hab. in Mexico." The type, in the German University at Prague, bears no data as to origin.

Stipa avenacea Willd. "hrb."; Steud. Nom. Bot. ed. 2. 2: 644. 1841, as synonym of *S. virescens* H. B. K.

Stipa arsenii Hack. Repert. Nov. Sp. Fedde 8: 515. 1910. "Mexico, Michoacan, prope Morelia, 2,200 m. s. m., leg. Fr. Arsene, no. 3211." The specimen has been examined in the Hackel Herbarium.

DESCRIPTION.

Culms erect, glabrous, mostly 75 to 120 cm. tall; sheaths glabrous; ligule firm, 1 to 2 mm. long; blades slender and involute, rather lax, those of the innovations numerous, glabrous or scabrous, 10 to 40 cm. long, about 1 mm. wide when flat; panicle narrow, 10 to 25 cm. long, the branches slender, appressed, 1 to several at a node, bearing 1 to few spikelets, the shorter pedicels shorter than the spikelets; glumes 7 to 8 mm. long, equal, rather broad, pale or purple, abruptly acuminate, obscurely 3-nerved; lemma dark brown at maturity, 5 to 6 mm. long, the callus about 1 mm. long, densely barbed with brown hairs, the body over 1 mm. broad, densely villous with brown hairs, contracted above to a very short undifferentiated neck, the summit bearing a close row of stiff erect brown hairs 0.5 mm. long; awn 1 to 2 cm. long, twice-geniculate, twisted and scabrous-pubescent to the second bend, straight and scabrous beyond, the first segment 3 to 5 mm. long, the first bend often at right angles, the second segment about as long as the first. (Pl. 52, figs. 3, 4. *Hitchcock* 5973.)

DISTRIBUTION.

Open woods, central Mexico.

ZACATECAS: Plateado, *Rose* 2750.
JALISCO: Mount Nevada, *Hitchcock* 7151. Volcano of Colima, *Jones* 479. Zapotlán, *Hitchcock* 7169.
HIDALGO: Real del Monte, *Clokey* 1900; *Rose, Painter & Rose* 8700.
MICHOACÁN: Morelia, *Arsène* 2699, 3211, 5305, 5375, 6749, 6998, 7338.
MEXICO: Popo Park, *Hitchcock* 5965, 5973, 6019.
FEDERAL DISTRICT: *Orcutt* 3731; *Pringle* 6588, 9574; *Hitchcock* 5947.
PUEBLA: Chinantla, *Liebmann* 649. Mount Orizaba, *Rose & Hay* 5671; *Hitchcock* 6266.
VERACRUZ: Cabrestros, *Liebmann* 650.
MORELOS: Sierra de Ajusco, *Pringle* 6236.
OAXACA: Cerro San Felipe, *Nelson* 1107; *Smith* 926; *Pringle* 4759. Cumbre de Estepec, *Liebmann* 648. Oaxaca, *Nelson* 1373.

29. Stipa mexicana Hitchc., sp. nov.

Culms cespitose, glabrous, erect, or usually geniculate or prostrate-spreading, mostly 20 to 30 cm. long, sometimes as much as 60 cm. long; sheaths glabrous, naked at the throat; ligule a very short firm membrane; blades firm, involute, sharp-pointed, glabrous beneath, scabrous on upper surface, mostly less than 10 cm. long and less than 0.3 mm. thick when rolled, sometimes as much as 20 cm.

long; panicle narrow, usually purplish, 5 to 10 cm. long, the branches appressed or ascending, short and few-flowered; glumes equal, about 1 cm. long, broad, 3-nerved, rather firm, glabrous, abruptly narrowed to an acute point; lemma 4 mm. long, finally dull brown, the callus rather short and comparatively blunt, densely barbed with white hairs, the body oblong, appressed-villous all over with short white hairs, somewhat narrowed at summit into a short firm whitish neck about 0.2 mm. long, ciliate with hairs about 0.5 mm. long; awn about 1 cm. long, weakly twice-geniculate, scabrous-pubescent to second bend. (Pl. 52, figs. 5, 6. *Pringle* 4299.)

Type in the U. S. National Herbarium, no. 993,386, collected in mountain meadows, Sierra de las Cruces, State of Mexico, Mexico, October 1, 1892, by C. G. Pringle (no. 4299).

This species approaches *S. mucronata*, but the panicle is narrower and more compact, the awns are shorter, and the neck of the fruit is shorter and less conspicuous. A specimen of this species is in the Paris Herbarium (H. B. K. Herbarium) under the name *S. mucronata*. (See discussion under *S. mucronata*.)

DISTRIBUTION.

Open woods and grassy slopes at high altitudes, southern Mexico to Peru.

MEXICO (State): Mount Popocatepetl, alt. 3,700 meters, *Hitchcock* 5989; alt. 3,500 meters, *Rose & Hay* 6035. Popo Park, alt. 2,300 meters, *Hitchcock* 6014. Sierra de las Cruces, alt. 3,000 meters, *Pringle* 4299, 11756. Nevada de Toluca, alt. 3,300 to 4,000 meters, *Rose & Painter* 6434.
HIDALGO: Real del Monte, *Clokey* 1901.
COLOMBIA: Bogotá, *Karsten*.
VENEZUELA: Páramo de Timotes, *Jahn* 772.
PERU: Mito, *Macbride & Featherstone* 1876.

30. **Stipa lemmoni** (Vasey) Scribn.

Stipa pringlei lemmoni Vasey, Contr. U. S. Nat. Herb. **3**: 55. 1892. "Mountains of Plumas county, Cal. (J. G. Lemmon)." The type, in the U. S. National Herbarium, is labeled, "Mohawk Valley, Plumas County, May 1889, J. G. Lemmon 5456." The glumes are 10 to 11 mm. long, the lemma 7.5 mm. long, and the culms puberulent below the nodes.

Stipa lemmoni Scribn. U. S. Dept. Agr. Div. Agrost. Circ. **30**: 3. 1901. Based on *S. pringlei lemmoni* Vasey.

Stipa lemmoni jonesii Scribn. U. S. Dept. Agr. Div. Agrost. Circ. **30**: 4. 1901. "This variety is represented in the National Herbarium by Nos. 3563, L. Schoenfeldt, collected at Laguna, Cal., June 4, 1894; 49, J. W. Blankinship, collected at Mount San Hedrim, Mendocino County, Cal.; 3298, Marcus E. Jones, collected at Emigrant Gap, Cal., June 28, 1882 (type). There is also a specimen from Mariposa County, Cal., collected by J. W. Congdon, June 4, 1897." The type specimen has a more slender, fewer-flowered panicle than that of *S. lemmoni*, the culms are glabrous below the nodes, the glumes are 8 to 9 mm. long. and the lemma about 6 mm. long. There are all gradations between them.

DESCRIPTION.

Culms erect, scaberulous, puberulent below the nodes, 30 to 80 cm. tall; sheaths glabrous; ligule membranaceous, decurrent, 1 to 3 mm. long; blades flat or involute, glabrous beneath, scabrous on the margins, scabrous-pubescent on the upper surface, 10 to 20 cm. long, 1 to 2 mm. wide, or those on the innovations very narrow; panicles narrow, rather compact, mostly pale, sometimes purplish, mostly 5 to 12 cm. long, the branches appressed, bearing 1 to few spikelets,

usually more or less villous at the base; glumes 8 to 10 mm. long, about equal, rather broad and firm, somewhat abruptly acuminate, glabrous, the first 5-nerved, the second 3-nerved with an outer obscure pair; lemma mostly 6 to 7 mm. long, pale or light brown, the callus rather blunt, 0.5 mm. long, barbed with white hairs, the body fusiform, 1.2 mm. wide, villous with appressed hairs, those at the summit and around the crown rather stiff, about 0.5 mm. long; awn 20 to 35 mm. long, twice-geniculate, twisted and appressed-pubescent to the second bend, the first segment 3 to 6 mm. long, the second 5 to 7 mm., the third 10 to 20 mm. long. (Pl. 52, figs. 7, 8. *Butler* 830.)

DISTRIBUTION.

Dry open ground and open woods, British Columbia to California.

BRITISH COLUMBIA: Vancouver Island, *Macoun* 109, 257; *Rosendahl* 1933.

IDAHO: Moscow Mountains, *Henderson* 4615.

WASHINGTON: Wenatchee Mountains, *Cotton* 1263, 1630, 1637. Hood River, *Howell* in 1882. Falcon Valley, *Suksdorf* 6273. Bingen, *Suksdorf* 5135, 8661, 10054. Perkins Creek, *Cotton* 1613. Spokane, *Chase* 4984; *Henderson* 2258. Rockland, *Suksdorf* 4056. Stehekin, *Griffiths & Cotton* 213.

OREGON: Eight Dollar Mountain, *Piper* 6478. West Fork, *Cusick* 4721. Roseburg, *Cusick* 3904, 3928. Siskiyou, *Hitchcock* 2893, 2922. Ashland Creek, *Cusick* 2857. Ukiah, *Eggleston* 12723. Klamath Falls, *Hitchcock* 2973. Waldo, *Howell* in 1884. Lower Applegate Creek, *Leiberg* 4089. Ashland, *Applegate* 2158.

CALIFORNIA: Eel River, *Bolander* 4692. Moffit Creek, *Butler* 830. Red Mountain, *Bolander* 6469. Long Valley, *Davy & Blasdale* 5287. Yosemite Valley, *Chase* 5713; Tehachapi, *Chase* 5731. Weaverville, *Yates* 269. Emigrant Gap, *Jones* 3298. Clarks, Yosemite National Park, *Bolander* 4865. Humboldt County, *Tracy* 2707, 4047. Goose Valley, *Eastwood* 911. Laguna, *Schoenfeldt* 3563. Plumas County, *Heller & Kennedy* 8712. Siskiyou County, *Heller* 7934. North Fork, *Griffiths* 4542. Castella, *Piper* 6333, 6334. Delta, *Heller* 11694.

31. **Stipa williamsii** Scribn.

Stipa williamsii Scribn. U. S. Dept. Agr. Div. Agrost. Bull. **11**: 45. 1898. "Dry soil on west side of Big Horn Mountain, near Monument Spring, Wyo., altitude 2,200 to 2,400 meters (no. 2804, Thomas A. Williams, August 3, 1897)." Other specimens mentioned are: Little Laramie River, *Williams* 2234; Jefferson City, *Scribner* 340. The type, in the U. S. National Herbarium, is about 90 cm. tall, the culms and sheaths are velvety-puberulent, the blades of the culm sparsely pubescent or glabrate.

DESCRIPTION.

Culms erect, rather robust, velvety-puberulent, glabrate above, 60 to 100 cm. tall, the nodes glabrous or glabrate; sheaths velvety-pubescent, the upper often glabrate; ligule about 0.5 mm. long; blades flat, those of the innovations more or less involute, more or less pubescent on one or both surfaces, 10 to 30 cm. long, 1 to 4 mm. wide; panicles narrow, moderately compact, sometimes rather loose, 10 to 20 cm. long, the branches appressed, two or more at each node, some short and floriferous from base, one usually longer and naked at base, the nodes glabrous or sparsely pilose; glumes about 1 cm. long, equal, hyaline, narrow, acuminate and short-awned, scaberulous, 3-nerved; lemma about 7 mm. long, pale or brownish at maturity, the callus sharp and rather slender, about 1 mm. long, barbed above the point with white hairs, the body narrowly

fusiform, villous all over with appressed whitish hairs, those of the crown scarcely different, about 1 mm. long; awn 3 to 5 cm. long, twisted and scabrous-pubescent to the second bend; anthers glabrous at tip or with 1 or 2 hairs.

This species is closely related to *S. columbiana*, especially to the variety *nelsoni*. The type is distinctly pubescent on culm, sheaths, and blades, as are many of the specimens cited below. On other specimens the pubescence is more scant, and may be absent except on the lowermost sheaths. The ligule is usually shorter, and the awns are usually longer than in *S. columbiana*. (Pl. 52, figs. 9, 10. *Williams* 2804.)

DISTRIBUTION.

Dry hills and plains, Montana and Washington to Colorado.

MONTANA: Butte, *Hitchcock* 2157. Indian Creek, *Rydberg & Bessey* 3552. Big Creek, *Griffiths & Lange* 167. Big Horn Mountains, *Williams* 2804. Jefferson City, *Scribner* 340.

WYOMING: Teton Pass, *Merrill & Wilcox* 235a. Jackson, *Merrill & Wilcox* 297, 303. Yellowstone National Park, *Hitchcock* 1916, 1928, 1964; *Tweedy* 613. Big Horn County, *Goodding* 301.

IDAHO: Latah County, *Henderson* 4614. Fremont County, *Merrill & Wilcox* 175. Bitter Root Mountains, *Chase* 5140.

WASHINGTON: Loomis, *Griffiths & Cotton* 328, 335. Wenatchee Mountains, *Cotton* 1304. Colville Reservation, *Griffiths & Cotton* 390.

OREGON: Wallowa Lake, *Shear* 1788. Umatilla, *Shear* 1687. Fort Klamath, *Hitchcock* 2997, 2998. Goose Creek, *Cusick* 2243. Wallowa River, *Cusick* 2321.

COLORADO: Routt County, *Shear & Bessey* 1380.

UTAH: Mount Logan, *Ball* 1284. Ephraim Canyon, *Tidestrom* 1757.

NEVADA: Summit Lake region, *Griffiths & Morris* 300. Kingston Ranger Station, *Hitchcock* 10655, 10658. Lone Mountain, *Hitchcock* 10715. Gold Creek, *Hitchcock* 10783.

32. Stipa viridula Trin.

Stipa viridula Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. **2**[1]: 39. 1836. Trinius states concerning the origin of the specimen he describes, "V. spp. Am. bor.?" The type, in the Trinius Herbarium, is labeled "Saskatchewan. Hooker 57. mis. 1835."

Stipa nuttalliana Steud. Nom. Bot. ed. 2. **2**: 643. 1841. Based on *Stipa parviflora* Nutt.[31] not Desf. Nuttall describes a plant from the plains of the upper Missouri River and refers it to *S. parviflora* Desf., of which he thinks it is a variety.

DESCRIPTION.

Culms erect or sometimes geniculate at base, glabrous or scaberulous, mostly 60 to 100 cm. tall; sheaths glabrous, villous at the throat, often rather sparingly so, more or less hispidulous in a line across the collar, villous on the margin; ligule membranaceous, about 1 mm. long; blades flat or, especially on the innovations, involute, mostly scabrous, sometimes glabrous beneath, 10 to 30 cm. long, 1 to 3 or even 5 mm. wide; panicle narrow, greenish or tawny at maturity, 10 to 20 cm. long, the branches appressed or ascending, somewhat distant but usually overlapping, 2 or 3 at a node or branching near base and appearing fascicled, some short, one longer and naked below, 3 to 7 or even 10 cm. long, the lower nodes hispidulous; glumes 7 to 10 mm. long, about equal, narrowed

[31] Gen. Pl. 1:59. 1818.

above and extending into a slender tip as much as 3 mm. long, hyaline with green nerves, 3-nerved, scaberulous on the keel and sometimes on the lateral nerves; lemma 5 to 6 mm. long, fusiform, at maturity plump, over 1 mm. wide, the callus rather blunt, about 0.5 mm. long, barbed with short whitish hairs, the body at maturity usually brown or brownish, rather sparingly villous all over with whitish appressed hairs, the surface roughened with minute papillae, the summit hispidulous with erect hairs 0.5 to 1 mm. long; awn 2 to 3 cm. long, twice-geniculate, slender, scabrous, twisted to the second bend, the first segment 3 to 4 mm. long, the second usually a little longer, the third somewhat flexuous; anthers bearing at apex a few hairs. (Pl. 52, figs. 11, 12. *Griffiths* 201.)

DISTRIBUTION.

Plains and dry slopes, Minnesota to Alberta and south to New Mexico.

SASKATCHEWAN: Red Deer Lakes, *Macoun* 74. Touchwood Hills, *Herriot* 77181. Breakmore, *Herriot* 77180.

ALBERTA: Calgary, *Hitchcock* 4972, 11457. Edmonton, *Hitchcock* 11362. Lethbridge, *Hitchcock* 4954.

MINNESOTA: St. Anthony Park, *Oswald* in 1911. Heron Lake, *Skinner* 41.

NORTH DAKOTA: Benson County, *Lunell* 1334. Minot, *Waldron* 1809; *Brannon* 113.

SOUTH DAKOTA: Redfield, *Griffiths* 201. Aberdeen, *Griffiths* 130, 828. Brookings, *Wilcox* 11. Hot Springs, *Rydberg* 1112; *Hitchcock* 11154. Custer, *Hitchcock* 11112. Edgemont, *Hitchcock* 11103.

IOWA: Ames, *Hitchcock* 11012 (introduced).

NEBRASKA: Halsey, *Hitchcock* 11048. Mullen, *Rydberg* 1598. Wiegand, *Clements* 2680.

MONTANA: Manhattan, *Shear* 413. Missoula, *Williams & Griffiths* 271, 272, 273. Gallatin, *Rydberg* 2180, 2285; *Shear* 528. Bozeman, *Rydberg* 3011. Jefferson City, *Scribner* 340. Shelby, *Hitchcock* 11330. Billings, *Hitchcock* 11212.

WYOMING: Gillette, *Hitchcock* 11188. Beulah, *Griffiths* 969. Hulett, *Griffiths* 933. Cassa, *Nelson* 8359. Badger, *Nelson* 8341. Welcome, *Williams* 2700a. Pine Bluff, *Nelson* 3613. Sibylee Creek, *Nelson* 473. Yellowstone National Park, *Hitchcock* 1930.

COLORADO: Estes Park, *Johnston* 702. Gato, *Baker* 222. Fort Collins, *Pammel* in 1896. Columbine, *Tweedy* 4367. Without locality, *Hall & Harbour* 626.

NEW MEXICO: Las Vegas, *Rose & Fitch* 17573.

33. Stipa vaseyi Scribn.

Stipa viridula var. *robusta* Vasey, Contr. U. S. Nat. Herb. **1**: 56. 1890. "Chenate Mountains (Presidio county). Ranges from Colorado to Mexico." This was included in an article by John M. Coulter on "A collection of plants made by Mr. G. C. Nealley, in the region of the Rio Grande, in Texas, from Brazos, Santiago to El Paso County." The type, in the U. S. National Herbarium, is numbered 714, and was collected in 1887. It is below the usual height for the species, being about 80 cm. tall. The lemma is 6.5 mm. long, the awn 18 mm. long.

Stipa robusta Scribn. U. S. Dept. Agr. Div. Agrost. Bull. **5**: 23. 1897. Based on "*S. viridula robusta* Vasey."

Stipa vaseyi Scribn. U. S. Dept. Agr. Div. Agrost. Bull. **11**: 46. 1898. Based on "*Stipa viridula robusta* Vasey, not *S. robusta* Nutt." *Stipa robusta* Nutt. was given by Trinius [22] as a synonym of *S. spartea*. It appears never to have been used as a valid name for a species, and might not have interfered with the use of *robusta*. It does not seem advisable to make this change now.

[22] Mém. Acad. St. Pétersb. VI. Sci. Nat. **5**[1]: 69. 1842.

DESCRIPTION.

Culms erect, robust, glabrous, mostly 1 to 1.5 meters tall; sheaths glabrous, villous at the throat and on the margin, a strong hispidulous line across the collar; ligule membranaceous, sometimes ciliate, 2 to 4 mm. long, shorter on the innovations; blades flat or on the innovations slender and involute, mostly glabrous, scaberulous on the margins and toward the tip, as much as 60 cm. long and 8 mm. wide; panicles narrow, compact, pale or greenish, often more or less interrupted below, as much as 30 cm. long and 2 cm. wide, the branches appressed, several at each node, some short, some as much as 8 cm. long and naked at base, bearing several spikelets, strongly villous or hispid at the lower nodes; glumes about 1 cm. long, equal, acuminate to a fine soft point but scarcely awned, rather firm, 3-nerved or the first 5-nerved, the nerves inconspicuous, lemma 6 to 8 mm. long, at maturity medium dark brown, the callus rather blunt, about 0.5 mm. long, densely barbed with whitish hairs, the body narrow-fusiform, narrowed above into an obscure neck, villous all over with appressed white hairs, those of the summit 1.5 to 2 mm. long; awn mostly 2 to 3 cm. long, scabrous, rather obscurely twice-geniculate, twisted to the second bend; anthers tipped with a minute tuft of hairs. (Pl. 52, figs. 13, 14. *Hitchcock* 13280.)

Stipa vaseyi, called sleepy grass, is reported on creditable authority to act as a narcotic on animals that graze upon it, especially affecting horses. Chemical analyses have failed to show the presence of poisonous properties and the grass appears to lose its narcotic effect when cut for hay. As yet there has been no exact experimentation upon the effect of sleepy grass, and the nature of its action must await detailed study. Although the species extends from Colorado to Arizona, the poisonous effect has been reported only from the vicinity of the Sacramento Mountains in New Mexico. (See Sampson, Native American Forage Plants, 229. 1924).

This species differs from *S. viridula* in the more robust habit, larger and more compact panicles, firmer, less hyaline glumes (the nerves thus less conspicuous), the acuminate, less attenuate-tipped glumes, and the longer, less turgid fruit, with longer hairs on the crown.

DISTRIBUTION.

Dry plains and hills and dry open woods, Colorado to northern Mexico.

TEXAS: San Diego, *Nealley* in 1891. Chenate Mountains, Presidio County, *Nealley* 714.

COLORADO: Idaho Springs, *Rydberg* 2493, *Shear* 725. Pagosa Springs, *Baker* 221. Colorado Springs, *Williams* 2130, 2156. Manitou, *Shear* 713, 715, 1109, *Hitchcock* 1695, 1709, 1775, 1783; *Chase* 5295; *Clements* 17. Sedalia, *Hitchcock* 16235. Starkville, *Chase* 5344. Twin Lakes, *Wolfe* 1104. Piedra, *Wooton* 2939. Salida, *Clements* 248. Georgetown, *Shear* 639. Ouray, *Hitchcock* 2239. Raton Mountains, *Griffiths* 5489.

NEW MEXICO: Cloudcroft, *Hitchcock* 13280, 13305. Santa Fe Canyon, *Rose* 17711. Santa Fe, *Standley*, 6472. Pecos, *Standley* 4901. Windsor Creek, *Standley* 4216. Glorietta Mountains, *Griffiths* 5040. Cimarron Canyon, *Griffiths* 5546. El Rito, *Wooton* 2991. Las Vegas, *Chase* 5861. Raton, *Standley* 6253; *Rose* 17559. Dulce, *Standley* 8113. White Mountains, *Wooton* 370.

ARIZONA: San Francisco Mountains, *Leiberg* 5908; *Lemmon* 3181. Volunteer Valley, *Lemmon* 4679.

COAHUILA: Lerios, *Palmer* 1249 in 1880. Saltillo, *Palmer* 317 in 1902.

34. **Stipa columbiana** Macoun.

Stipa columbiana Macoun, Cat. Can. Pl. 4: 191. 1888. "Yale, B. C.; Cedar Hill, four miles from Victoria, Vancouver Island. (Macoun.)" The two specimens cited are in the herbarium of the Geological Survey at Ottawa, Canada. The Yale specimen (no. 28,940, collected on rocks, May 17, 1875) in the Ottawa Herbarium, may be considered the type. It is about 35 cm. tall, with a panicle 10 cm. long, the culm blades mostly flat, the glumes 1 cm. long, the lemma 6 mm. long, with a callus, 0.5 mm. long, the awn 2.5 cm. long, scabrous-pubescent below. The Cedar Hill specimen (no. 28,941, collected on dry slopes, May 7, 1875) is similar. In both specimens the panicles are not fully developed, being partially inclosed at the base in the uppermost sheath.

Stipa viridula var. *minor* Vasey, Contr. U. S. Nat. Herb. **3**: 50. 1892. "Smaller [than *S. viridula*] throughout, occurs at higher altitudes, the awns usually shorter." No specimen is cited and no locality is given. The type, in the U. S. National Herbarium, was collected on Kelso Mountain, near Torrey's Peak, Colo., by G. W. Letterman (no. 95), at 13,000 feet altitude, August 13, 1885. The name is in Doctor Vasey's hand. This specimen is closely similar to the two specimens mentioned under *S. columbiana*, but is rather less developed. The lemmas are about 5 mm. long, but are immature. Four other specimens have the name in Doctor Vasey's hand, two being now referred to *Stipa lemmoni* and two being similar to the Letterman specimen. The last is the only specimen cited by Scribner (see next paragraph), when he raised the variety to specific rank, and thus will stand as the type.

Stipa minor Scribn. U. S. Dept. Agr. Div. Agrost. Bull. **11**: 46. 1898. Based on *S. viridula minor* Vasey. The species is described and several specimens are cited.

DESCRIPTION.

Culms erect, glabrous, mostly 30 to 60 cm. tall, sometimes as much as 1 meter; sheaths glabrous, naked at the throat; ligule rather firm, 1 to 2 mm. long; blades mostly involute, especially on the innovations, those of the culm sometimes flat, glabrous or nearly so, 10 to 20 cm. long or sometimes longer, on the innovations mostly about 0.5 mm. thick, sometimes wider on the culms; panicles narrow, compact or rather loose, often purplish, 5 to 15 cm. long, the branches short and appressed; glumes about 1 cm. long, nearly equal, acuminate or awn-pointed, glabrous or slightly scaberulous, 3-nerved, the nerves rather obscure because of the firm texture; lemma 6 to 7 mm. long, the callus short, barbed, the body densely appressed-villous, scarcely narrowed at summit, the hairs at the summit about the same as the others; awn mostly 2 to 2.5 cm. long, more or less twice-geniculate, scabrous or somewhat scabrous-pubescent to the second bend. (Pl. 52, figs. 15, 16. *Hitchcock* 4911.)

A few specimens from New Mexico (*Standley* 4555, 14727; *Wooton* in 1907; *Vasey* in 1881) have narrower stiffer fewer-flowered panicles and firmer glumes than found in the typical form.

DISTRIBUTION.

Dry plains and open woods, Wyoming to Yukon and south to New Mexico and California.

ALBERTA: Mount Paget, *Macoun* 64852. Banff, *Hitchcock* 11506. Laggan, *Macoun* 64851. Pipestone Creek, *Macoun* 64850. Jasper Park, *Macoun* 98206. Waterton Lake, *Macoun* 13336.

BRITISH COLUMBIA: Yale, *Macoun* 18. Cedar Hill, *Macoun* 75. Columbia Valley, *Macoun* 61. Kamloops, *Macoun* 16.

YUKON: Whitehorse, *Hitchcock* 4303.

SOUTH DAKOTA: Custer, *Hitchcock* 11123.
MONTANA: Lima, *Rydberg* 2302. Glacier National Park, *Hitchcock* 11282, 11311. Prickly Pear Creek, *Scribner* in 1883. Black Hawk, *Rydberg* 3281. Columbia Falls, *Hitchcock* 4911, 4937. Bitter Root Mountains, *Chase* 5239.
WYOMING: Clear Creek, *Williams & Griffiths* 98. Yellowstone National Park, *Nelson & Nelson* 6677; *Chase* 5254; *Rydberg & Bessey* 3551b. Battle Lake, *Nelson* 4026. Sundance, *Williams* 2601. Ferris Mountains, *Nelson* 4961. Antelope Basin, *Nelson* 7478. Bridger Peak, *Goodding* 1940. Chimney Park, *Nelson* 450. Laramie Hills, *Nelson* 408.
IDAHO: Victor, *Merrill & Wilcox* 221.
WASHINGTON: Pullman, *Piper* 1762. Brewster, *Griffiths & Cotton* 258.
OREGON: Wallowa Lake, *Shear* 1759, 1780, 1785; *Cusick* 2321. Wallowa National Forest, *Jardine* 336. Grizzly Range, *Leiberg* 4125. Albee, *Chase* 4802. Wallowa Mountains, *Cusick* 2242, 3195. Crook County, *Leiberg* 495. Steins Mountains, *Griffiths & Morris* 552.
COLORADO: Veta Pass, *Shear* 843. Hebron, *Shear & Bessey* 1467. Tolland, *Ramaley* 8824. Robinson, *Shear* 1046½. Red Mountain, *Shear* 1190. Buena Vista, *Shear* 1006, 1025. Marshall Pass, *Clements* 202; *Baker* 478. Villa Grove, *Shear* 890. Leadville, *Hitchcock* 2325. Anita Peak, *Goodding* 1762. Rogers, *Baker* 801. Cumbres, *Baker* 218. Boulder, *Hitchcock* 16239.
UTAH: Wasatch Mountains, *Tidestrom* 602, 1807, 1875, 1892; *Coville & Tidestrom* 17. Manti National Forest, *Hitchcock* 10947, 10953. Marysvale, *Jones* 5940. Tushar Mountains, *Eggleston* 10496. Abajo Mountains, *Rydberg & Garrett* 9857.
NEVADA: Pine Forest Mountains, *Griffiths & Morris* 212. East Humboldt Mountains, *Watson* 1295. Lone Mountain, *Hitchcock* 10717. Glenbrook, *Hitchcock* 3191. Ely, *Hitchcock* 10806, 10836.
NEW MEXICO: Brazos Canyon, *Standley & Bollman* 10911. Chama, *Wooton* 2980; *Baker* 219. Silver City, *Metcalfe* 745. Pecos National Forest, *Standley* 4542, 4555. Las Vegas, *Vasey* in 1881. White Mountains, *Wooton* in 1907. Ute Park, *Standley* 14727.
CALIFORNIA: Yosemite National Park, *Hitchcock* 3271½, 3324. Summit Valley, *Pringle* in 1882. Mount Lyall, *Hitchcock* 3304. Sierra National Forest, *Hitchcock* 3393.

34a. Stipa columbiana nelsoni (Scribn.) Hitchc.

Stipa nelsoni Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 11: 46. 1898. "Woods Landing, Albany County, Wyo., altitude 2,600 meters (No. 3963, A. Nelson, August 9, 1897); rich soil, Sheep Mountain, * * * (No. 2269, Thomas A. Williams, July 2, 1897.) Named for Prof. Aven Nelson." The type (*Nelson* 3963), in the U. S. National Herbarium, closely resembles the type of *S. williamsi*; but the culms and leaves are glabrous, except for the lowermost internode of the main culm, which is puberulent. The sheaths are somewhat pilose at the throat, and some of the first glumes are 3-nerved and some 5-nerved.

DESCRIPTION.

Differing in its usually large size, being as much as 1 meter tall, the broader culm blades, and the larger and denser panicle. The lemma is 6 to 7 mm. long, the awn as much as 3.5 cm. long or even longer. In some specimens (for example, *Griffiths & Cotton* 433, from eastern Washington) the awns are as much as 5.5 cm. long. (Pl. 52, fig. 17. *Nelson* 3963.)

DISTRIBUTION.

Dry plains and open woods, Alberta and Washington to Colorado and Lower California.

ALBERTA: Banff, *McCalla* 2327. Craigmyle District, *Brinkman* 790.
BRITISH COLUMBIA: Yale, *Macoun* 18 in 1889.
MONTANA: Columbia Falls, *Williams* 1039; *Hitchcock* 4912, 4939. Spanish Basin, *Rydberg* 3153. Bonner, *Sandberg, Heller & MacDougal* 986. Barker, *Rydberg* 3374. Sheep Creek, *Rydberg* 3307. Anaconda, *Blankinship* 755. Jefferson City, *Scribner* 340.[23] Little Belt Mountains, *Rydberg* 3422.
WYOMING: Battle Lake, *Nelson* 4060. Wilson, *Merrill & Wilcox* 273. Yellowstone National Park, *Rydberg & Bessey* 3551; *Mearns* 3781; *Hitchcock* 1938, 1990, 2022; *Tweedy* 609. Jackson, *Merrill & Wilcox* 290. Seminole Mountains, *Nelson* 4922. Jacksons Hole, *Merrill & Wilcox* 311. Sheep Mountain, *Williams* 2269. Evanston, *Williams* 2423. Antelope Basin, *Nelson* 7478. Medicine Bow Mountains, *Nelson* 7829.
IDAHO: Victor, *Merrill & Wilcox* 216, 223. Lake Waha, *Henderson* 2856. Montpelier, *Williams* 2535, 2540. St. Anthony, *Merrill & Wilcox* 150. Saw Tooth National Forest, *Woods & Tidestrom* 2557. Beaver Canyon, *Rydberg* 2345. St. Marys River, *Leiberg* 1173. Soldier Mountain, *Henderson* 3287.
WASHINGTON: Spangle, *Suksdorf* 8726. Spokane, *Suksdorf* 8844. Oaksdale, *Suksdorf* 8865. Steptoe, *Vasey* 3040.
OREGON: Blue Mountains, *Griffiths & Hunter* 116. Klamath Marsh, *Leiberg* 741. Dry Creek, *Coville & Applegate* 601. Wallowa Mountains, *Cusick* 3296c, 3308a, 3367.
COLORADO: Idaho Springs, *Rydberg* 2489. Marshall Pass, *Shear* 902. Sheephorn Divide, *Shear & Bessey* 1546. Cerro Summit, *Baker* 420. Tolland, *Ramaley* 6918. Veta Pass, *Shear* 47. Ouray, *Hitchcock* 2226. Silverton, *Shear* 1212.
UTAH: Abajo Mountains, *Rydberg & Garrett* 9856. Wasatch Mountains, *Coville & Tidestrom* 4, 16; *Tidestrom* 1748, 1844. Manti National Forest, *Hitchcock* 10892, 10908.
NEVADA: Austin, *Hitchcock* 10612, 10654, 10687. Gold Creek, *Hitchcock* 10754. Lone Mountain, *Hitchcock* 10722. Reno, *Tracy* 418.
CALIFORNIA: Mount Dana, *Bolander* 5078. Yosemite National Park, *Lemmon* in 1897. Truckee, *Hitchcock* 10501. San Nicholas Island, *Trask* 11.
LOWER CALIFORNIA: Guadalupe Ranch, *Orcutt* in 1886. San Telmo, *Orcutt* in 1886. Todos Santos Island, *Anthony* 202.

35. Stipa lettermani Vasey.

Stipa lettermani Vasey, Bull. Torrey Club **13**: 53. 1886. "Collected in Idaho by Prof. G. W. Letterman." The type, in the U. S. National Herbarium, collected on Snake River in August, 1885, is numbered 102. The culms are 30 to 50 cm. tall, the lemma about 5 mm. long including the callus (this 0.5 mm. long), the hairs at summit as much as 1 mm. long, the awn about 1.5 mm. long.

Stipa viridula var. *lettermani* Vasey, Contr. U. S. Nat. Herb. **3**: 50. 1892. Presumably based on *S. lettermani* Vasey, but no synonymy is given and no specimens are cited.

DESCRIPTION.

Culms cespitose, often in large tufts, glabrous or minutely scaberulous, erect, mostly 30 to 60 cm. tall; sheaths glabrous, not pilose at throat; ligule a rather firm membrane less than 0.5 mm. long; blades slender, involute, the innovations

[23] There are several Scribner collections numbered 340.

numerous, glabrous or minutely scaberulous, 10 to 20 cm. long, mostly less than 0.5 mm. thick; panicles slender, narrow, rather loosely flowered, pale or greenish, 10 to 15 cm. long, the branches short and appressed, few-flowered; glumes about 6 mm. long, equal, acuminate, or awn-pointed, pale, rather firm, rather obscurely 3-nerved, minutely scaberulous; lemma 4 to 5 mm. long, pale, the callus 0.5 mm. long, rather sparsely barbed, the body narrow, somewhat narrowed at the summit, appressed-villous, the hairs longer above, those of the summit 1 to 1.5 mm. long; awn slender, obscurely twice-geniculate, scabrous, 1.5 to 2 cm. long. (Pl. 52, figs. 18, 19. *Letterman* 102.)

DISTRIBUTION.

Open ground or open woods at upper altitudes, Wyoming to New Mexico and California.

MONTANA: Lima, *Shear* 595.

WYOMING: Jacksons Hole, *Merrill & Wilcox* 267, 314, 360. Teton Mountains, *Nelson & Nelson* 6534. Leckie, *Merrill & Wilcox* 58. Yellowstone National Park, Electric Peak, *Hitchcock* 2005. Sheep Mountain, *Williams* 2309. Bighorn County, *Tweedy* 72. Jackson Lake, *Merrill* 102. Evanston, *Williams* 2433. Teton Forest Reserve, *Merrill & Wilcox* 393. Jackson, *Merrill & Wilcox* 287.

IDAHO: Ketchum, *Nelson & Macbride* 1224. Wood River, *Henderson* 3286. Snake River, *Letterman* 102.

OREGON: Mount Thielson, *Coville & Applegate* 431. Crater Lake, *Hitchcock* 3049; *Heller* 13448.

COLORADO: Routt County, *Eastwood* in 1891. Fall Creek, *Rose* 138.

UTAH: Manti National Forest, *Hitchcock* 10901. Burrville, *Jones* 5642. Cottonwood Canyon, *Garrett* 1650. Alta, *Jones* 1146. Tushar Mountains, *Eggleston* 10412. Ephraim Canyon, *Tidestrom* 1755. Twelve Mile Canyon, *Eggleston* 1776. Summit County, *Garrett* 2621. Gunnison Valley, *Coville & Tidestrom* 14. Mount Ellen, *Jones* 5684. Ogden, *Tracy* 355.

NEVADA: Ely, *Hitchcock* 10812.

NEW MEXICO: Santa Fe, *Standley* 6459. Chama, *Standley* 6570; *Wooton* 2980. Pecos, *Standley* 5188. Brazos Canyon, *Standley & Bollman* 10866.

CALIFORNIA: Lincoln Valley, *Kennedy & Doten* 215. Soda Springs, *Jones* 2553. Summit Valley, *Pringle* in 1882. Truckee, *Hitchcock* in 1901. Bear Valley, *Parish Brothers* 1552.

36. **Stipa pinetorum** Jones.

Stipa pinetorum Jones, Proc. Calif. Acad. II. **5**: 724. 1895. "No. 6023 p. September 8, 1894, Panguitch Lake, Utah, 8,400 alt., growing in open places among the pine forests." Collected by Marcus E. Jones. A specimen of this collection is in the U. S. National Herbarium.

DESCRIPTION.

Culms cespitose, often in large tufts, the inner part dying out leaving a zone of living plants; culms erect, puberulent below the nodes, otherwise glabrous, slender, 30 to 50 cm. tall; sheaths glabrous; ligule a very short membrane; blades involute-capillary, more or less flexuous, slightly scabrous, mostly clustered near the base, two on the culm, the basal 5 to 12 cm. long, scarcely 0.5 mm. thick; panicle narrow, 8 to 10 cm. long, the branches short and appressed or ascending, few-flowered; glumes about 9 mm. long, equal, acuminate, obscurely nerved, lemma 5 mm. long, 0.5 mm. wide, narrowly fusiform, pale or finally brownish, clothed especially on the upper half with hairs 2 mm. long, forming a conspicu-

ous tuft, exceeding the body of the lemma, the summit bearing two very thin slender teeth at base of awn; awn about 2 cm. long, twice-geniculate, scaberulous or nearly glabrous, the first segment 6 mm., the second 4 mm. long; palea a little more than half as long as the lemma, villous at top with hairs 0.2 mm. long. (Pl. 52, figs. 20, 21. *Jones* 6023.)

This species resembles *S. lettermanni* in habit, but differs in the conspicuously villous lemmas.

DISTRIBUTION.

Open pine woods at high altitudes, Colorado and Utah.

COLORADO: Leadville, in open pine woods, *Hitchcock* 2281.
UTAH: Panguitch Lake, *Jones* 6023p.

37. Stipa arida Jones.

Stipa arida Jones, Proc. Calif. Acad. II. **5**: 725. 1895. "No. 5377, Marysvale, Utah, on very dry talus slopes in shingle, 6,000 alt., June 4, 1894." The description is in an article by M. E. Jones (Contributions to Western Botany), on plants collected by himself. A duplicate type is in the U. S. National Herbarium. The panicles for the most part are inclosed at base in the uppermost sheath.

Stipa mormonum Mez, Repert. Nov. Sp. Fedde **17**: 209. 1921. "Vereinigte Staaten von Nordamerika: Utah (Jones)." The type has been examined at the Berlin Herbarium by Mrs. Chase. It is numbered 2106.

DESCRIPTION.

Culms densely cespitose, erect, scaberulous below the nodes, 40 to 80 cm. tall; sheaths glabrous or somewhat scaberulous; ligule a ciliate membrane about 0.5 mm. long; blades flat or involute, scabrous, 10 to 20 cm. long, 1 to 2 mm. wide when flat; panicle narrow, compact, somewhat nodding, pale or silvery, 10 to 15 cm. long, the branches short, appressed; glumes 8 to 12 mm. long, equal or the first a little longer, hyaline, scaberulous, acuminate, the first 3-nerved, the second 5-nerved; lemma about 5 mm. long, pale or light brown, the callus very sharp, about 0.5 mm. long, barbed with whitish hairs, the body narrow, villous with appressed white hairs except the narrowed slightly roughened summit, more or less glabrate on the sides, the summit naked or sparsely ciliate; awn 4 to 6 cm. long, capillary, scaberulous, loosely twisted for 1 to 2 cm., untwisted and flexuous beyond, sometimes obscurely once or twice geniculate; palea half as long as lemma. (Pl. 52, figs. 22, 23. *Jones* 5377.)

DISTRIBUTION.

Rocky slopes, Utah and Arizona.

UTAH: Richfield, *Ward* 251. Marysvale, *Jones* 5377. Milford, *Jones* in 1880.
ARIZONA: Bright Angel Trail, Grand Canyon, *Grant* 5718; *Chase* 5809, 5814; *Hitchcock* 10446, 13063.

38. Stipa editorum Fourn.

Stipa editorum Fourn. Mex. Pl. **2**: 75. 1886. "In valle edita inter *La Noria del Viejo* et *La Miquiguana*, augusto (Karw. n. 1009c)." The type collected by Karwinsky has been examined at the St. Petersburg Botanical Garden.

DESCRIPTION.

Culms erect, glabrous, closely cespitose, 80 to 100 cm. tall, the scales at the somewhat bulbous base felty-pubescent; sheaths glabrous, more or less pilose at the throat; ligule 3 to 6 mm. long, thin; blades flat or usually loosely involute,

tapering to a fine involute point, glabrous beneath, more or less scabrous toward the point, 20 to 40 cm. long, 2 to 3 mm. wide on the culm, very slender on the innovations; panicle narrow, rather soft, 10 to 20 cm. long, or even longer, the branches appressed, several at each node, many-flowered, the shorter ones floriferous from base, the longer ones naked at base, as much as 10 cm. long, the pedicels slender; glumes about 9 mm. long, subequal, narrow, hyaline, acuminate to a fine point, 1-nerved, the second with a faint lateral pair of nerves, the first scaberulous on the keel; lemma narrowly fusiform, pale, 5 to 6 mm. long, the callus acute, rather slender, nearly 1 mm. long, densely barbed with white hairs, the body appressed-villous all over, the hairs at the summit few, about 1 mm. long; awn very slender, 3 to 4 cm. long, scaberulous, flexuous, usually rather obscurely twice-geniculate; anthers with a minute tuft of hairs at summit. (Pl. 52, figs. 24, 25. *Hitchcock* 6469.)

DISTRIBUTION.

Dry open ground and rocky hills, central Mexico.

HIDALGO: Pachuca, *Hitchcock* 6716.

PUEBLA: Esperanza, *Hitchcock* 6469, 6494, 6500. Oriental, *Orcutt* 3947. San Marcos, *Hitchcock* 6520.

39. Stipa tenuissima Trin.

Stipa tenuissima Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. **2**[1]: 36. 1836. "V. spp. Chil." The type specimen, in the Trinius Herbarium, is from Mendoza, collected by Gillies and sent to Trinius by Hooker. Trinius gives the origin of the type as Chile, but Mendoza is in western Argentina. The fruit of the type and of the other specimens cited from Argentina is only 2 mm. long.

Stipa mendocina Phil. Anal. Univ. Chile **27**: 339. 1865. "Ad radicem Andium Mendocinarum l. d. la Guardia," collected by Max. Landbeck. Referred to *S. tenuissima* from the description.

Stipa geniculata Phil. Anal. Univ. Chile **36**: 204. 1870. Collected in the vicinity of Mendoza, Argentina. The type has not been examined, but the description is sufficient to identify the species.

Stipa cirrosa Fourn. Mex. Pl. **2**: 75. 1886. "Absque loco (*Karw.* n. 1009)." The type, collected by Karwinsky, has been examined at the herbarium of the St. Petersburg Botanical Garden. The fruit is 2 mm. long.

Stipa subulata Fourn. Mex. Pl. **2**: 75. 1886. "Tanque Colorado (*Karw.* n. 1009b)." The type has been examined at the herbarium of the St. Petersburg Botanical Garden. The fruit is 2 mm. long.

Stipa oreophila Speg. Contr. Fl. Ventana 65. 1896. No exact locality is given. The article is on the flora of Sierra de la Ventana, a mountain range in the southern part of the Province of Buenos Aires. The type has not been examined. The fruit is described as being 3 mm. long.

Stipa tenuissima oreophila Speg. Anal. Mus. Nac. Montevideo **22**: 155. 1901. Based on *Stipa oreophila* Speg.

Stipa tenuissima planicola Speg. Anal. Mus. Nac. Montevideo **22**: 155. 1901. No specimen is mentioned.

Stipa sanluisensis Speg. Anal. Mus. Nac. Montevideo **4**: 156. 1901. Type, from San Luis, Argentina, has not been examined. The specimen examined, *Parodi* 335, differs from *S. tenuissima* chiefly in the much shorter awn.

Stipa debilis Mez, Repert. Nov. Sp. Fedde **17**: 209. 1921. "Argentina, bei Cosquin (Hieronymus)." The type has been examined at the Berlin Herbarium. It is the short-awned form.

DESCRIPTION.

Culms densely cespitose in large tufts, slender, wiry, erect, glabrous, 30 to 70 cm. tall; sheaths glabrous or minutely scaberulous; ligule acute, 2 mm. long; blades slender and wiry, closely involute, tapering to a fine point, more or less scabrous, 15 to 30 cm. long or even longer, scarcely 0.5 mm. wide when rolled; panicle narrow, soft, nodding, 10 to 30 cm. long, the branches appressed, slender, rather loosely flowered; glumes about 1 cm. long, the first a little the longer, pale or purplish, soft and hyaline, glabrous, minutely scaberulous on the keel, faintly 3-nerved, tapering to a fine soft awn or awnlike point; lemma 2 to 3 mm. long, oblong-elliptic, plump, brown, glabrous, roughened with minute papillae, the callus 0.5 mm. long, densely barbed, the hairs extending a short distance up on the keel of the lemma, the neck abruptly narrowed, slightly hispidulous; awn capillary, flexuous, obscurely geniculate about the middle, scaberulous, about 5 cm. long. (Pl. 52, figs. 26, 27. *Hitchcock* 13498.)

DISTRIBUTION.

Dry open ground, rocky slopes, and open dry woods, Texas to central Mexico; also in Argentina.

TEXAS: Guadalupe Mountains, *Bailey* 694. Limpia Canyon, *Nealley* 131; *Hansen* 763. Chisos Mountains, *Havard* 12.

NEW MEXICO: Socorro, *Plank* 35. Queen, *Hitchcock* 13498. Without locality, *Wright* 1999.

COAHUILA: Saltillo, *Arsène* 3469; *Palmer* 455 in 1904; *Nil* in 1909. Carneros Pass, *Pringle* 3274. Chojo Grande, *Palmer* 341½ in 1904.

PUEBLA: San Marcos, *Hitchcock* 6518, 6519, 6540. Chalchicomula, *Smith* 556. Esperanza, *Arsène* in 1907; *Hitchcock* 6464, 6499.

ARGENTINA: Estancia San Teodoro, *Stuckert* 13649; *Kneucker, Gram. Exs.* 198. Capilla del Monte, *Stuckert* 19008. Sierra de la Ventura, *Dusén* in 1904. Córdoba, *Parodi* 335. Cacheuta, *Spegazzini* 2394. Aguas Buenas, *Parodi* 4814. Boven, *Parodi* 4822.

40. **Stipa ichu** (Ruiz & Pav.) Kunth.

Jarava ichu Ruiz & Pav. Fl. Peruv. Chil. **1**: 5. *pl. 6. f. b.* 1798. "Habitat in alpibus (vernaculi *Punas de los Andes*) *Cautae, Huarochiri, Xauxae, Huancavelicae, Tarmae Huanuci, Huamalies*, et aliarum Provinciarum Regni Peruviani." Concerning the common names it is stated, "Vernacule *Ichu* et *Ocssa* nuncupatur." The type has not been examined, but the figure is characteristic.

The original place of publication is usually given as the earlier work, the Prodromus, by the same authors.[24] This work describes genera only and no species is mentioned in connection with *Jarava*. According to the Type-basis Code the genus is not effectively published at this place, and the species *J. ichu* is certainly not published here. The descriptions are given in parallel columns, Spanish and Latin. In some cases the common name of the genus is given after the generic name in the Spanish column. This is given *Jarava* (*ichu*). This appears to be the ground for giving this work as the place of publication of *Jarava ichu*. It is evident that the authors are not proposing a new species here, but are giving the common name.

Jarava usitata Pers. Syn. Pl. **1**: 6. 1805. Based on *Jarava ichu* Ruiz & Pav.

Stipa jarava Beauv. Ess. Agrost. 18, 179. *pl. 6. f. 3.* 1812. Under *Stipa* Beauvois includes *Jarava* Ruiz & Pav. as a synonym. In the index the name occurs as "Stipa Jarava? nob." The description of the plate is headed *Stipa*

[24] Ruiz & Pav. Fl. Peruv. Chil. Prodr. 2. *pl. 1.* 1794.

jarava. Since Ruiz and Pavon included only one species in their genus *Jarava* we may assume *Stipa jarava* Beauv. to be based on *Jarava ichu* Ruiz & Pav.

Stipa eriostachya H. B. K. Nov. Gen. & Sp. **1**: 127. *pl. 41*. 1816. "Crescit locis planis regni Quitensis juxta Riobamba, inter Ticsan et Guamote et prope Mulalo in radicibus montis Cotopaxi; item in temperatis regni Mexicani prope Moran." The type, in the "H. B. K." Herbarium in the Paris Herbarium, bears the name in Kunth's script and the number 3060, but no data.

Stipa ichu Kunth, Rév. Gram. **1**: 60. 1829. Based on *Jarava ichu* Ruiz & Pav.

Jarapha ichu Ruiz. & Pav.; Steud. Nom. Bot. ed. 2. **1**: 787. 1840, as synonym of *Stipa ichu*.

Jarapha arundinacea Willd.; Steud. Nom. Bot. ed. 2. **1**: 797. 1840, as synonym of *Stipa eriostachya*.

Jarapha usitata Pers.; Steud. Nom. Bot. ed. 2. **1**: 797. 1840, as synonym of *Stipa ichu*.

Stipa pungens Nees & Mey. Act. Acad. Caes. Leop. Carol. **19**: Suppl. **1**: 151. 1843. "In campis arenosis ad Arequipam urbem et ad lacum Titicacam Peruviae." The name was mentioned earlier [25] as a nomen nudum. The type has been examined in the Berlin Herbarium.

Stipa gynerioides Phil. Anal. Univ. Chile **36**: 203. 1870. "Mendoza." The type has not been examined. Grisebach [26] refers this to *Stipa ichu* with certainty.

Stipa liebmanni Fourn. Mex. Pl. **2**: 76. 1886. "Cerro Leon pr. Perote, [Veracruz] (Liebm. n. 667)." In the U. S. National Herbarium is a duplicate type, labeled in Fournier's hand. It is a depauperate specimen about 15 cm. tall, with a much reduced panicle.

Stipa ichu var. *gynerioides* Hack. Anal. Mus. Nac. Buenos Aires **11**: 98. 1904. Based on *Stipa gynerioides* Phil.

Stipa ichu var. *gynerioides* forma *interrupta* Hack. Anal. Mus. Nac. Buenos Aires **21**: 76. 1911. "Differt panicula inferne interrupta. St. [Stuckert] no. 18,989 (12. I. 1907) Capilla del Monte, C (M. E.) [Mario Estrada]." In the U. S. National Herbarium is a specimen with all the data of the cited specimen except the number, which is 19010. It corresponds with the description of this form.

DESCRIPTION.

Culms closely cespitose, often in large bunches, erect, slender, wiry, glabrous, mostly 80 to 100 cm. tall, sometimes depauperate; sheaths glabrous or scaberulous minutely hispidulous at the throat; ligule rather firm, about 2 mm. long, on the innovations much shorter; blades of the culm flat or involute, as much as 4 mm. wide, those of the numerous innovations slender, involute, wiry, mostly scabrous, 30 to 60 cm. long; panicle narrow, nodding, shining, pale or purplish, densely flowered, often inclosed at base in the uppermost more or less inflated sheath, 15 to 40 cm. long, the numerous branches appressed, many-flowered, the axis scaberulous, the pedicels very scabrous; glumes about 1 cm. long, less than 0.5 mm. wide, equal, hyaline, papery, gradually narrowed to a fine soft point, faintly 3-nerved, glabrous, lemma fusiform, about 2.5 mm. long, rather sparsely short-pubescent, narrowed into a short neck bearing a conspicuous tuft of ascending or spreading hairs 3 to 4 mm. long; awn slender, 1 to 2 cm. long, flexuous or obscurely twice-geniculate, scaberulous, the lower part more or less twisted. (Pl. 52, figs. 28, 29. *Hitchcock* 6521.)

This species is distinguished by the small fruits, with a crown of long hairs. In the Andes the grass is commonly known as "ichu."

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[25] Meyen, Reis. Erd. **1**: 484. 1834.

[26] Abh. Ges. Wiss. Göttingen **19**: 258. 1874.

DISTRIBUTION.

Dry hills and plains, Mexico, southward through the Andes to Argentina.

San Luis Potosí: San Luis Potosí, *Parry & Palmer* 967; *Schaffner* 174.

Mexico: Sierra de las Cruces, *Pringle* 4281. Ixtaccihuatl, *Purpus* 323, 1610. Popocatepetl, *Purpus* 1609. Montezuma, *Bourgeau* 1156. Cima, *Orcutt* 3788. Mixcoac, *Arsène* 8804.

Puebla: Manzanilla, *Arsène* 1695. Acatzinco, *Arsène* 1572, 1575. Chalchicomula, *Pringle* 9566; *Hitchcock* 6275. Mount Orizaba, alt. 3,300 meters, *Smith* 603; *Seaton* 194. San Marcos, *Hitchcock* 6521. Esperanza, *Hitchcock* 6467, 6498, 6502; *Pittier* 423.

Hidalgo: Real del Monte, *Clokey* 1896.

Oaxaca: Sierra de Clavellinas, *Pringle* 4998. Chinantla, *Liebmann* 669.

Guatemala: Volcano Agua, *Hitchcock* 9123.

Colombia: Calaguala, *Pennell* 7125. Bogotá, *Ariste Joseph* in 1905.

Ecuador: Quito, *Spruce* 5923. Ambato, *Pachano* 93. Cotocallao, *Mille* 255. Alausí, *Hitchcock* 20701. Punin, *Anthony & Tate* 442.

Peru: Occa Pampa, *Shepard* 63. Ollantaytambo, *Hitchcock* 22527; *Cook & Gilbert* 676. Oroya, *Rose* 18694; *Macbride & Featherstone* 952. Río Blanco, *Macbride & Featherstone* 644, 645. Matucana, *Macbride & Featherstone* 254, 335. Goyllarisquisca, *Hitchcock* 22293. Cuzco, *Hitchcock* 22460. Chuquibambilla, *Hitchcock* 22427. Junín, *Hitchcock* 22174.

Bolivia: La Paz, *Pflanz* 2544; *Buchtien* 2492, 2545; *Holway* 451, 597. Pasña, *Buchtien* 1185. Cochabamba, *Holway* 330, 342, 345, 362, 387, 389, 399; *Hitchcock* 22785, 22812. Sorata, *Holway* 529; *Mandon* 1273. Palca, *Hitchcock* 22558, 22581. Atocha, *Hitchcock* 22872.

Argentina: La Falda, *Holway* 2026. Córdoba Province, *Stuckert* 11775, 17818, 19010; *Parodi* 3321, 4668; *Kneucker Gram. Exs.* 200, 200a. Catamarca Province, *Jörgensen* 1362. Esquina Grande, *Jörgensen* 1447. Jujuy, *Fries* 372. Santiago del Estero, *Parodi* 389. Colonia Alvear, *Parodi* 4837. Boven, *Parodi* 4824. Without locality, *Lorentz* 77.

UNIDENTIFIED SPECIES.

Stipa grisebachii Fourn. Mex. Pl. **2**: 74. 1886.

Fournier's description is as follows: "Culmo bipedali stramineo glabro; foliis rigidis convolutis laete viridibus, radicalibus et caulinis mediocribus lanceolato-linearibus, intus secus mesonevrum et margines ciliato-echinatis, ligula brevi pilosa; panicula laxa 4–5-pollicari, radiis binis a basi floriferis; glumis violaceis acutis; palea a basi fere usque ad apicem barbata; coronula ciliata; arista torta valida longissime pubescente.—In valle Mexicensi (*Schaffn.* n. 17 a pl. ed. Hohen.); in collibus pr. Santa Fe in valle Mexicensi, julio (*Bourg.* n. 677)."

No specimens of either cited collection have been seen. The description applies fairly well to *S. leucotricha* Trin. & Rupr.

Stipa virletii Fourn. Mex. Pl. **2**: 75. 1886.

Fournier's description is as follows: "Foliis planis lanceolato-linearibus semipedalibus basi intus pilosis; ligula inconspicua; panicula 3–4-pollicari, radiis geminis; rhachi pubescente; glumis inaequalibus glabris acutis decoloratis, superiore latiore et longiore, flosculo piloso cum mesonevro prominente; coronula ciliata; arista pilosa torta longissima.—San Luis de Potosi (*Virl.* n. 1376)."

Stipa koleotricha Steud. Syn. Pl. Glum. **1**: 125. 1854.

Steudel's description is as follows: "Culmo erecto valido elato glabro; vaginis dense sericeo-pilosis, foliis lanceolato-linearibus elongatis (1–2 pedalibus) striatis sparsim pilosis vel glabratis; paniculae amplae dense verticillatae ramis

erectis coarctatis; flosculis pedicellatis; paleis nervosis acutis; arista geniculata vix torta nuda flosculis duplo longiore.—Cordillera Vera Cruz (*Galeotti* 1840)."

This is probably not a species of *Stipa*.

STIPA SPICATA Walt. Fl. Carol. 78. 1888.

Walter's description is as follows: "Spicata? 4. Aristis nudis, receptaculo elongato in spicam dentibus bifloris plumosis, floribus alternis muticis, alternis aristatis; calycibus alternis concavis, alternis convexis."

This may be a species of *Andropogon*, possibly *A. scoparius* Michx.

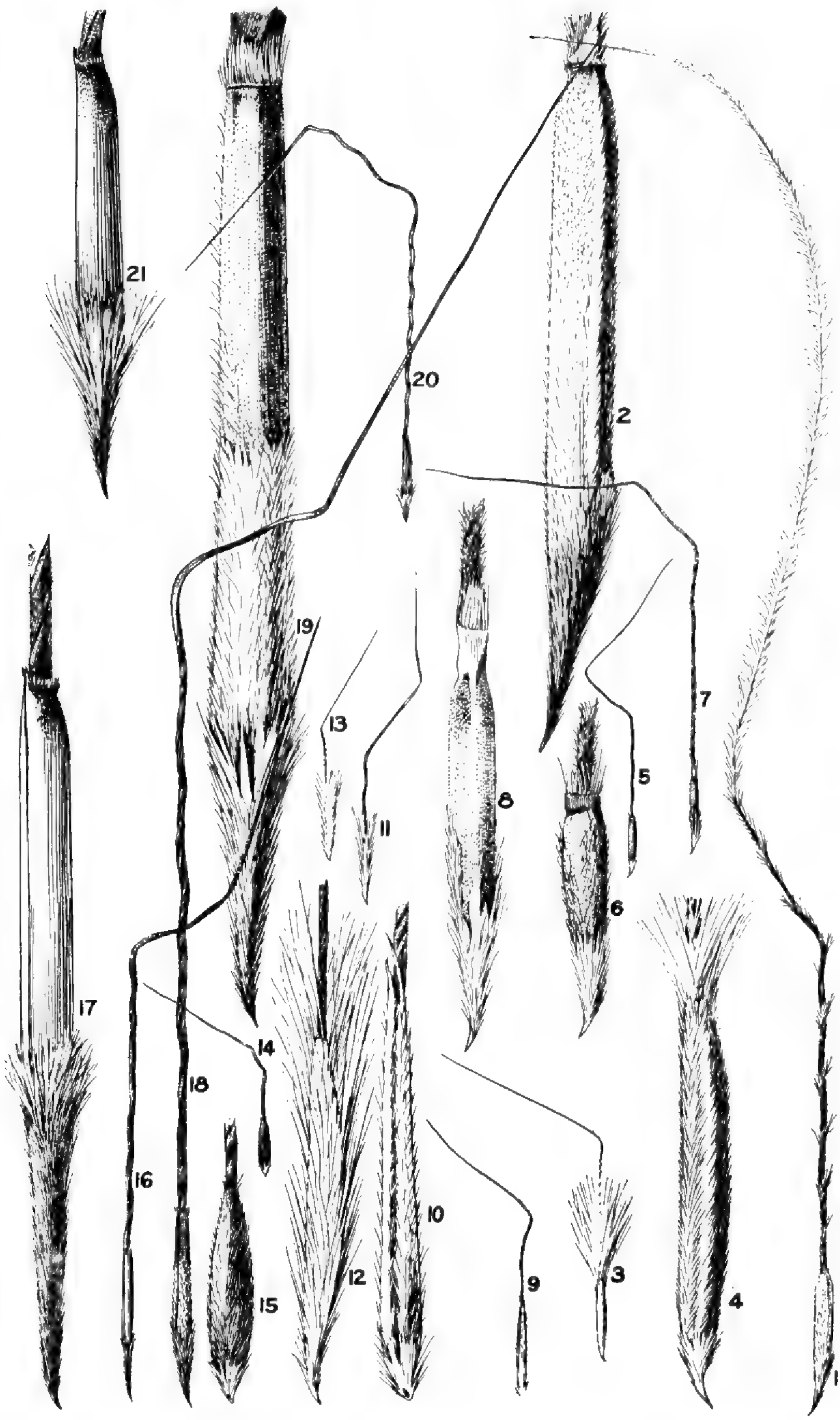
EXCLUDED SPECIES.

The following names, at some time included in *Stipa*, comprise only those based on species found in North America:

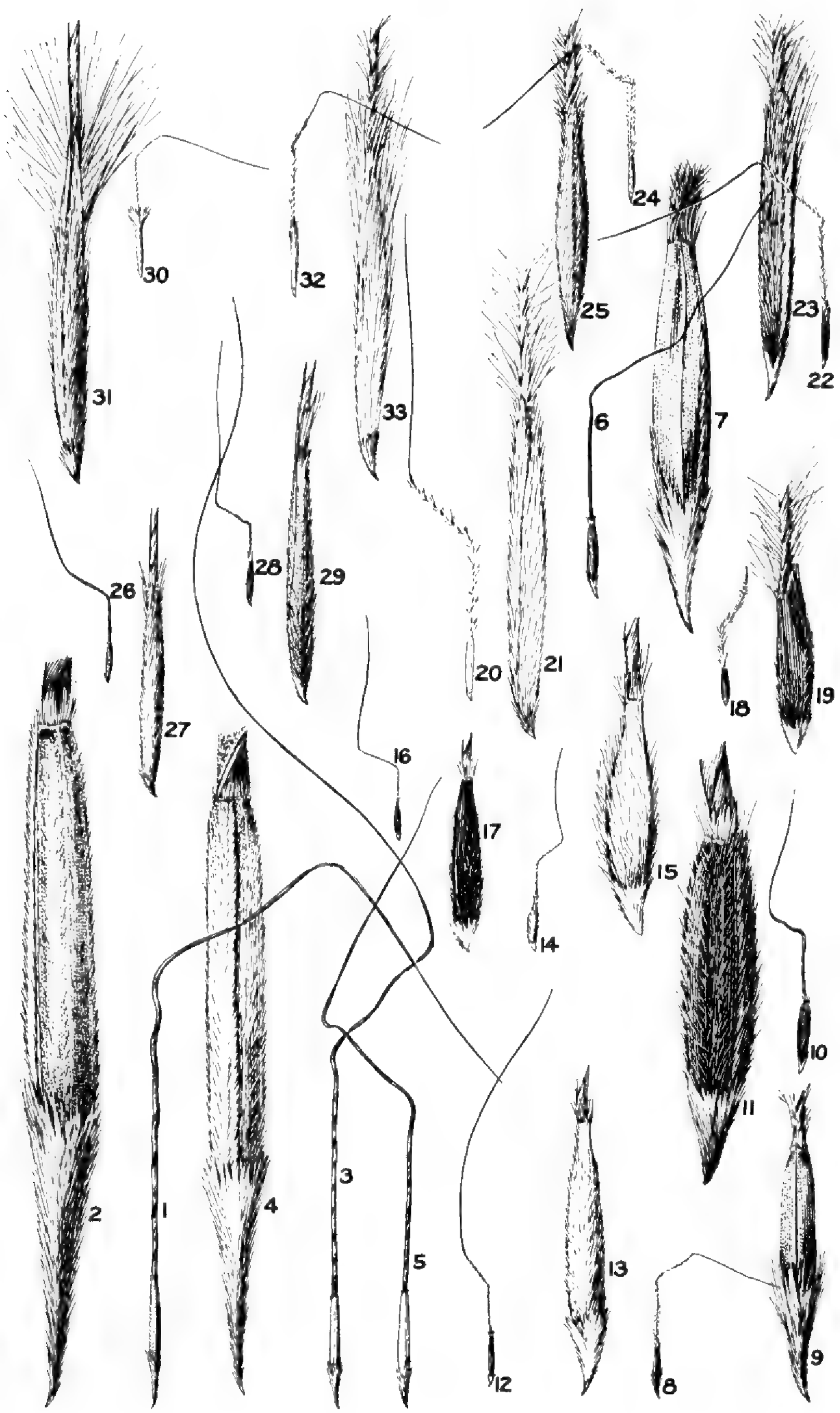
Stipa bloomeri Boland. = *Oryzopsis bloomeri* (Boland.) Ricker
Stipa brevicalyx Fourn. = *Piptochaetium brevicalyx* (Fourn.) Ricker
Stipa caduca Scribn. = *Oryzopsis bloomeri* (Boland.) Ricker
Stipa canadensis Poir. = *Oryzopsis canadensis* (Poir.) Torr.
Stipa capillaris Lam. = *Muhlenbergia capillaris* (Lam.) Trin.
Stipa demissa Steud. = *Limnodea arkansana* (Nutt.) L. H. Dewey
Stipa diffusa Walt. = *Muhlenbergia capillaris* (Lam.) Trin.
Stipa expansa Poir. = *Muhlenbergia expansa* (DC.) Trin.
Stipa fimbriata H. B. K. = *Oryzopsis fimbriata* (H. B. K.) Hemsl.
Stipa hymenoides Roem. & Schult. = *Oryzopsis hymenoides* (Roem. & Schult.) Ricker
Stipa juncea Michx. = *Oryzopsis canadensis* (Poir.) Torr.
Stipa kingii Boland. = *Oryzopsis kingii* (Boland.) Beal
Stipa latifolia Rasp. = *Olyra latifolia* L.
Stipa linearifolia Fourn. = *Oryzopsis sp.*
Stipa macounii Scribn. = *Oryzopsis canadensis* (Poir.) Torr.
Stipa melanocarpa Muhl. = *Heteropogon melanocarpus* (Ell.) Benth.
Stipa membranacea Pursh. = *Oryzopsis hymenoides* (Roem. & Schult.) Ricker
Stipa patens Willd. = *Triniochloa stipoides* (H. B. K.) Hitchc.
Stipa pauciflora Rasp. = *Lithachne pauciflora* (Swartz) Beauv.
Stipa rostrata Willd. = *Triniochloa stipoides* (H. B. K.) Hitchc.
Stipa sericea Michx. = *Muhlenbergia capillaris* (Lam.) Trin.
Stipa stricta Lam. = *Sorghastrum nutans* (L.) Nash?
Stipa villosa Walt. = *Sorghastrum nutans* (L.) Nash

LIST OF NEW SPECIES AND SUBSPECIES AND NEW NAMES.

	Page
Stipa angustifolia Hitchc., sp. nov	246
Stipa columbiana nelsoni (Scribn.) Hitchc	254
Stipa nelsoni Scribn.	
Stipa constricta Hitchc., sp. nov	244
Stipa coronata parishii (Vasey) Hitchc	227
Stipa parishii Vasey.	
Stipa leiantha Hitchc., sp. nov	236
Stipa mexicana Hitchc., sp. nov	247
Stipa saxicola Hitchc., sp. nov	232
Stipa spartea curtiseta Hitchc., subsp. nov	230



FRUITS OF STIPA



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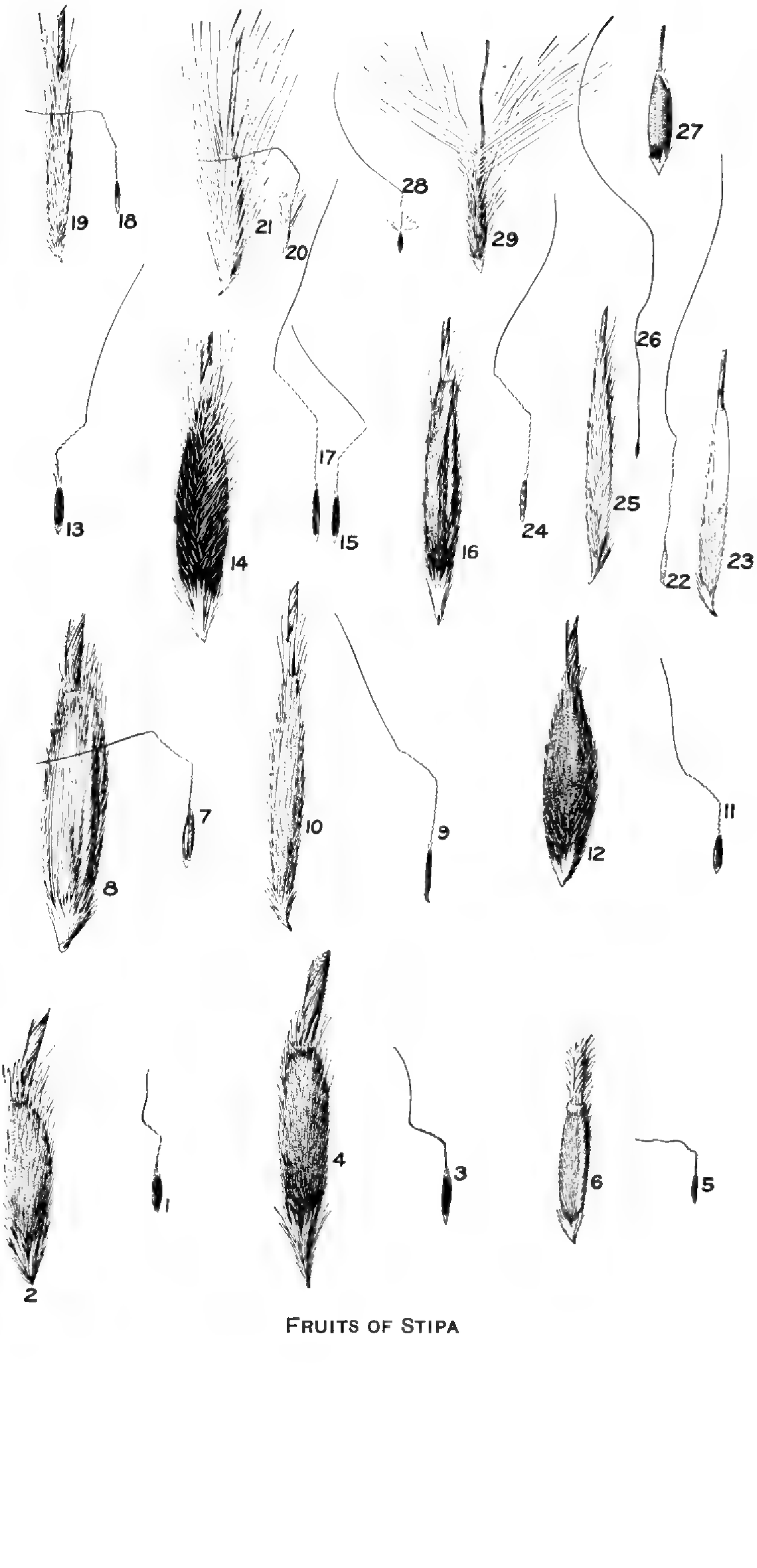

FRUITS OF STIPA

SYNOPSIS OF THE SOUTH AMERICAN SPECIES OF STIPA.

By A. S. Hitchcock.

INTRODUCTION.

The United States National Herbarium has the type or duplicate type specimens of a large number of species of *Stipa* from South America. The most important of these are the Hackel types. In 1922 Agnes Chase visited Vienna to examine the Hackel Herbarium which had been acquired by the Museum of Natural History. Through the kindness of Doctor Zahlbruckner, the custodian, Mrs. Chase was permitted to take duplicates of species originally described by Professor Hackel, or, when the material was scant, to take fragments. These specimens were supplemented by notes and photographs when necessary.

Dr. R. Pilger, of the Botanical Museum at Berlin, has very kindly supplied us with portions, more or less complete, of the types of species described by him. So far as they are at Berlin, he has also sent fragments from the types of species described by Mez.

In 1907 the writer visited the Academy of Sciences at St. Petersburg and was allowed by the curator to take fragments from the types of species of grasses described by Trinius. Of these a large number are from Brazil.

The custodians of other herbaria have been courteous in supplying fragments of types of several species of *Stipa* not included in the other collections mentioned. Recently the United States National Herbarium acquired the large collection of Bolivian plants made by Dr. Otto Buchtien, and the National Herbarium has numerous specimens collected by Arechavaleta, Stuckert, Holway, Hassler, Parodi, Macbride, and others, as shown by the citation of specimens in the present paper. In 1923 the writer made collections of grasses in Ecuador, Peru, and Bolivia.

On the other hand, the United States National Herbarium does not contain representatives of all the published species of *Stipa* from South America. The desiderata are chiefly from Argentina and Chile. Spegazzini published a paper on the species of *Stipa* from Argentina,[1] in which he described 51 species, many of them new. Some of these would be referred by agrostologists to the allied genera *Oryzopsis*,

[1] Stipeae Platenses, Anal. Mus. Nac. Montevideo **4**:1–167. 1901.

Nassella, and *Piptochaetium*, but of the species of true *Stipa* there are several of which no material is at hand. R. A. Philippi published numerous new species of *Stipa* from Chile, in several papers devoted to the botany of that country. Of these many duplicate types or authentic specimens are in the United States National Herbarium, but not all are thus represented.

The material at hand of the genus *Stipa* was abundant enough to warrant its study in connection with the revision of the North American species, but not complete enough to include in a revision of the species of all America. It is for this reason that the results of the study of the South American species are presented separately, as a synopsis of the species in the United States National Herbarium. It is hoped that the key will aid in the identification of the South American species, and will stimulate an interest that will result in the receipt of material to supplement our present collections. It is hoped also that ultimately a complete revision of the South American species of *Stipa* may be made.

North American species of *Stipa* that are found also in South America are included in this synopsis by name only, with the distribution by countries and with a reference to the page in the preceding paper where the species is described.

SYSTEMATIC TREATMENT.

KEY TO SPECIES.

First segment of awn strongly plumose.
  First segment strongly plumose on the lower two-thirds.
    Terminal segment 15 to 25 mm. long ..... **1. S. speciosa.**
    Terminal segment 50 to 100 mm. long ..... **2. S. patagonica.**
  First segment plumose on the upper half, less so below ..... **3. S. humilis.**
First segment of awn not strongly plumose (sometimes with scattered long hairs) or not more plumose than the terminal segment.
  Fruiting lemma not over 3 mm. long; panicle long, narrow, dense, silvery.
    Summit bearing a dense ring of ascending or spreading hairs, 3 to 4 mm. long.
      Blades closely involute ..... **4. S. ichu.**
      Blades flat ..... **5. S. milleana.**
    Summit slightly hispidulous, but lacking long hairs.
      Fruit terete ..... **6. S. tenuissima.**
      Fruit obconic, gibbous ..... **7. S. pampagrandensis.**
  Fruiting lemma more than 3 mm. long (if shorter, the panicle not long and dense).
    Upper part of lemma pilose with long hairs (longer than those of the body).
      Culms zigzag, spreading, puberulous ..... **8. S. tortuosa.**
      Culms erect, cespitose, glabrous.
        Panicle loose, pale, the branches and pedicels flexuous; hairs confined to upper millimeter of the lemma ..... **9. S. papposa.**
        Panicle rather compact, often purple, the branches and pedicels erect or ascending.

Terminal segment of awn 2 cm. long.
Terminal segment of awn straight---------- **10. S. dusenii.**
Terminal segment of awn flexuous---------- **11. S. capilliseta.**
Terminal segment of awn 1 to 1.5 cm. long, straight.
Throat of sheath villous; ligule short---------- **12. S. nardoides.**
Throat of sheath glabrous; ligule 2 to 5 mm. long.
Panicle 5 to 6 cm. long, dense and spikelike- **13. S. hans-meyeri.**
Panicle 12 to 20 cm. long, narrow but not dense-- **14. S. rosea.**
Upper part of lemma not conspicuously pilose, or the hairs not longer than those of the body.
Awn plumose, especially the terminal segment.
Lemma about 5 mm. long; first segment of awn somewhat villous. **15. S. plumosa.**
Lemma 9 to 10 mm. long.
First segment of awn glabrous.
Terminal segment 7 cm. long, the hairs 4 mm. long; first and second segments each 15 mm. long; callus pubescent----- **16. S.neaei.**
Terminal segment 5 cm. long, the hairs 3 mm. long; first and second segments each 10 cm. long; callus glabrous. **17. S. pogonathera.**
First segment of awn villous---------- **18. S. argentea.**
Awn not plumose on the terminal segment.
Summit of lemma smooth, cylindric, forming a crown, usually slightly larger than the neck, often whitish.
Crown extending upward into a prominent appendage as much as 6 mm. long---------- **19. S. charruana.**
Crown only slightly or not at all appendaged.
First segment of awn 7 to 9 cm. long; fruit about 15 mm. long; glumes 3 to 4 cm. long---------- **20. S. melanosperma.**
First segment of awn less than 5 cm. long; fruit not over 10 mm. long; glumes mostly less than 2 cm. long.
Pubescence on fruit extending, at least in lines, nearly to the summit.
Upper part of fruit (4 mm. long) and base of awn loosely long-villous---------- **21. S. depauperata.**
Upper part of fruit not long-villous.
Fruit 3.5 to 5 mm. long.
Callus 0.5 to 1 mm. long; fruit evenly pubescent nearly to summit.
Lemma 3.5 mm. long; callus 0.5 mm. long. **22. S. philippii.**
Lemma 4 to 5 mm. long; callus 1 mm. long.
Blades flat or loosely rolled, as much as 3 mm. wide.
Awn glabrous or scaberulous; fruit 4 mm. long---------- **23. S. lenta.**
Awn short-pilose below; fruit 5 mm. long.
Blades involute---------- **24. S. karsteni.**
Branches of panicle glabrous, 1 to 3-flowered; fruit 5 mm. long------- **25. S. brachyphylla.**
Branches of panicle scabrous, several-flowered; fruit 4 mm. long---------- **26. S. mexicana.**
Callus 1.5 mm. long, fruit pubescent in lines above.
Blades glabrous, flat, mostly over 5 mm. wide. **27. S. megapotamia.**

Blades villous, more or less convolute, mostly less than 3 mm. wide----------**28. S. lachnophylla.**
Fruit 6 to 14 mm. long.
Fruit 8 to 14 mm. long.
Awn 7 to 10 cm. long.
Fruit 12 to 14 mm. long----------**29. S. clarazii.**
Fruit about 10 mm. long----------**30. S. longiglumis.**
Fruit 8 mm. long----------**31. S. poeppigiana.**
Awn 2 cm. long----------**32. S. curicoana.**
Fruit 6 to 7 mm. long.
Panicle loose and open, the lower branches drooping, as much as 10 cm. long; fruit somewhat gibbous at summit----------**33. S. laxa.**
Panicle rather compact, the lower branches short and ascending----------**34. S. mucronata.**
Pubescence on fruit confined to the callus and lower part of the body.
Fruit 3 to 4 mm. long.
Awn 5 to 7 cm. long, the terminal segment long and flexuous----------**35. S. tenuis.**
Awn 2 to 3 cm. long, the terminal segment 10 to 15 mm. long, slightly flexuous.
Callus 0.5 mm. long; awn slender, obscurely geniculate----------**36. S. hyalina.**
Callus 1 mm. long; awn rather stout, twice-geniculate----------**37. S. juergensii.**
Fruit 5 to 10 mm. long.
Fruit smooth, very slender, the callus felty-pubescent; blades capillary-involute----------**38. S. trichocaulos.**
Fruit more or less papillose-roughened, the callus villous-pubescent.
Blades closely involute, stiff, wiry. Fruit pale, slender----------**39. S. papillosa.**
Blades flat or involute, not stiff and wiry.
Fruit papillose at the summit only, the body smooth and minutely striate----------**40. S. hackeli.**
Fruit papillose on body at least at summit, the body not striate.
Fruit compressed and asymmetric at summit below crown.
Fruit 5 mm. long----------**41. S. duriuscula.**
Fruit 8 mm. long----------**42. S. contracta.**
Fruit terete toward summit or nearly so.
Crown indistinct, the fruit 6 to 7 mm. long, narrowed toward summit with no constriction below crown.
Awn 2 cm. long, the first segment 5 to 8 mm----------**43. S. gilliesii.**
Awn 7 cm. long, the first segment 3 cm----------**44. S. nutans.**
Crown distinct, the fruit abruptly narrowed and somewhat constricted below crown.
Fruit about 1 cm. long.
Terminal segment of awn 5 to 7 cm. long, flexuous----------**45. S. macrathera.**

Terminal segment of awn 2 to 3 cm. long, straight or nearly so_46. **S. fernandeziana.**
Fruit 7 to 8 mm. long.
Fruit barely roughened at summit, smooth below_____47. **S. barbinodis.**
Fruit papillose especially toward summit. **48. S. neesiana.**
Summit of lemma not differentiated into a smooth cylindric crown.
Blades involute-filiform, firm.
Awn shorter than body of fruit_____49. **S. saltensis.**
Awn longer than body of fruit.
Awn with scattered long hairs on the first segment; annual. **50. S. annua.**
Awn with no scattered hairs; perennials.
Panicle compact, densely flowered, 15 to 20 cm. long; lemma 4 mm. long, narrow; awn 3 cm. long____51. **S. filifolia.**
Panicle narrow but rather loose.
Lemma villous, the upper hairs 1 to 2 mm. long.
Glumes 1 cm. long_____52. **S. brevipes.**
Glumes 4 to 6 mm. long.
Awn glabrous; fruit 4 mm. long__53. **S. leptostachya.**
Awn villous; fruit 3 mm. long.
Awn 1.5 to 2 cm. long_____54. **S. dasycarpa.**
Awn about 5 mm. long_____55. **S. violacea.**
Lemma smooth on upper part or pubescent only.
Awn twisted and geniculate.
Awn once-geniculate, slightly twisted, about 1 cm. long_____56. **S. litoralis.**
Awn twice-geniculate, evidently twisted, 3 to 8 cm. long.
Body of lemma pubescent.
Awn villous below with appressed hairs 2 mm. long_____57. **S. curviseta.**
Awn not villous.
Fruit pubescent on lower part of body.
Fruit 4 mm. long_____58. **S. stuckertii.**
Fruit 6 mm. long_____59. **S. juncoides.**
Fruit 9 mm long_____60. **S. tenuiculmis.**
Fruit pubescent all over, 3 to 5 mm. long.
Fruit 3 mm. long.
Glumes 4 to 5 mm. long__61. **S. rupestris.**
Glumes 8 to 9 mm. long. **62. S. featherstonei.**
Fruit 5 mm. long.
Awn about 15 mm. long___63. **S. caudata.**
Awn about 40 mm. long__64. **S. macbridei.**
Body of lemma glabrous.
Fruit 7 to 8 mm. long, gradually narrowed to summit.
Terminal segment of awn flexuous, 5 cm. long_____65. **S. flexibarbata.**
Terminal segment of awn nearly straight, 3 cm. long.
Fruit 8 mm. long; first segment of awn 2 cm. long_____66. **S. leucogluma.**

Fruit 7 mm. long; first segment of awn 1 cm. long.....67. **S. filiculmis.**
Fruit 6 mm. long, abruptly narrowed at summit; terminal segment of awn flexuous, 6 cm. long. **68. S. hypogona.**
Fruit 4 mm. long.....69. **S. curamalalensis.**

Awn untwisted, curved or flexuous, not geniculate.
Awn 1 or 2 cm. long, curved.
Body of lemma flattened, 1 mm. broad. **70. S. breviculmis.**
Body of lemma terete, fusiform, 0.5 mm. broad.
Lemma 3 mm. long; awn 1 cm. long.
Glumes obtuse, 3 mm. long.....71. **S. obtusa.**
Glumes acute, 5 mm. long.....72. **S. rigidiseta.**
Lemma 4 mm. long; awn 2 cm. long. **73. S. peruviana.**
Awn 3 to 4 cm. long, delicate and flexuous. **74. S. venusta.**

Blades flat or loosely involute.
Culms much-branched.....75. **S. polyclada.**
Culms simple.
Awn pilose below.
Body of lemma compressed, glabrous, 1 mm. broad..... **76. S. hirtifolia.**
Body of lemma terete.
Lemma 7 to 8 mm. long.....77. **S. hirtiflora.**
Lemma about 5 mm. long.....78. **S. ibarrensis.**
Awn not pilose (sparsely so in *S. arcuata*).
Lemma about 1 cm. long; awn 4 to 8 cm. long.
First segment of awn 4 to 5 cm. long.....79. **S. sellowiana.**
First segment of awn about 2 cm. long.....80. **S. arcuata.**
First segment of awn about 1 cm. long..81. **S. paniculata.**
Lemma 2.5 to 6 mm. long.
Fruit obovate, turgid, 3 mm. long.....82. **S. inconspicua.**
Fruit oblong or fusiform.
Lemma 2.5 mm. long.....83. **S. airoides.**
Lemma 3.5 to 6 mm. long.
Awn 3 to 5 cm. long.
Lemma 3.5 mm. long, 0.5 mm. wide; awn 3 cm. long. **84. S. illimanica.**
Lemma 5 mm. long, narrow; awn 4 to 5 cm. long. **85. S. holwayi.**
Awn 1 to 2 cm. long.
Leaves strongly distichous.....86. **S. disticha.**
Leaves not distichous.
Blades involute.....87. **S. brachychaeta.**
Blades flat.
Lemma strongly villous all over with ascending hairs 2 to 3 mm. long. **88. S. calamagrostis.**
Lemma sparsely villous with hairs less than 1 mm. long.....89. **S. pittieri.**

1. Stipa speciosa Trin. & Rupr.

Bolivia, Argentina, Chile. See page 221.

2. Stipa patagonica Speg.

Stipa patagonica Speg. Revist. Fac. Agron. Vet. **3**: 581. 1897. "Rio Gallegos * * * Rio Santa Cruz." The type has not been examined.

ARGENTINA: General Roca, Río Negro, *Fischer* 47. Lago General Paz, Chubut, *Gerling* 146. Puerto San Antonio, *Dusén* 5228. Pino Hachado Neuquen, *Parodi* 2387.

3. Stipa humilis Cav.

Stipa humilis Cav. Icon. Pl. **5**: 41. *pl. 466. f. 1.* 1799. Described from Deseado, Patagonia. The type, examined at the herbarium of the Madrid Botanic Garden, is labeled "Puerto Deseado. Nee dedet." It differs from *S. speciosa* in having a more slender awn, the first segment scarcely twisted, pilose on the upper half to the bend and much less so on the lower half. Cavanilles's figure exaggerates this.

Stipa chrysophylla Desv. in Gay, Fl. Chil. **6**: 278. *pl. 76. f. 2.* 1853. Desvaux divides *S. chrysophylla* into var. *α minor* and var. *β major*, citing a collection by Gay in "valle de Toro" as var. *α*. Dr. Lecomte has kindly sent me a fragment from a specimen in the Paris Herbarium, collected in the valle del Toro, Coquimbo, Chile, by Gay, which is undoubtedly the type of *S. chrysophylla α minor*, though the name is given on the label as a variety of *humilis*. The first segment of the awn is 12 mm. long, plumose throughout but less so on the lower half, the second segment about the same length, scabrous, bent at an angle of about 45 degrees. Desvaux differentiates *S. speciosa* from *S. chrysophylla* by the more robust awn, larger florets, and shorter palea.

Stipa speciosa gymnostachya Hauman, Anal. Soc. Cienc. Argentina **86**: 240. 1918. High Cordillera of Mendoza. Dr. Parodi has kindly sent a portion of the type specimen.

Stipa kurtzii Mez, Repert. Nov. Sp. Fedde **17**: 204. 1921. "Argentina, Mendoza, Cordillere von Malalhué (Kurtz)." The type has been examined in the Berlin Herbarium.

ARGENTINA: Coast of Patagonia, *Eights*. Northern Chubut, *Acosta* in 1914. Bahía Cracker, *Pennington* 33. Río Santa Cruz, *Dusén* 5569, 5861. San José, *Dusén* 5341. Mendoza, *Malme* 2855. Río Tupungato, *Hauman* in 1910. Peninsula Valdés, *Ferro* 5053. Las Cuevas, Province Mendoza, *Spegazzini* 2389. Puente del Inca, *Spegazzini* 2388. Río Gallegos, *Dauber* 2572, 2574.

CHILE: Coquimbo, *Philippi*. Santiago, *Wilkes Expl. Exped.* Juncal, *Buchtien* in 1903. Talca, *Philippi*.

4. Stipa ichu (Ruiz & Pav.) Kunth.

Colombia, Ecuador, Peru, Bolivia, Argentina. See page 259.

5. Stipa milleana Hitchc., sp. nov.

Perennial; culms erect, puberulent, especially below the nodes, rather stout, several-noded (nodes as many as 6), as much as 1 meter tall; sheaths glabrous or slightly retrorsely roughened, the collar more or less puberulent; ligule a very short membrane (less than 1 mm. long); blades flat, 30 to 40 cm. long, as much as 8 mm. wide, glabrous beneath, more or less puberulent on the upper surface, long-acuminate; panicle greenish or somewhat tawny, narrow, rather dense, 20 to 40 cm. long, interrupted below, the branches appressed or ascending,

2 to 5 cm. long, overlapping and densely flowered, the main axis glabrous; pedicels slender, scabrous, the lateral shorter than the spikelet; glumes narrow, thin, acuminate and short-aristate, 3-nerved, about 6 mm. long, scaberulous on keels; lemma elliptic, 2 mm. long, greenish or brownish, villous with long hairs about 1 mm. long, the callus short and rather blunt (0.3 mm. long), the summit bearing several hairs 2 to 3 mm. long; awn slender, minutely scaberulous, reflexed by a semicircular bend, the first section loosely twisted, a little longer than the hairs, the second section nearly straight, 7 to 10 mm. long.

Type in U. S. National Herbarium, no. 1,188,857, collected on Mount Pichincha, near Quito, Ecuador, by L. Mille, S. J. (no. 256).

Other specimens, are: Near Quito, *Mille* 259, 392; *Sodiro* in 1893 (2 specimens). Alausí, *Hitchcock* 20698, 20727.

This species is allied to *S. ichu*, but differs in the broad flat blades (somewhat rolled in drying), the scarcely silvery inflorescence, the shape of the fruit and the recurved awn.

6. Stipa tenuissima Trin.

Argentina. See page 258.

7. Stipa pampagrandensis Speg.

Stipa pampagrandensis Speg. Anal. Mus. Nac. Montevideo **4**: 158. *f. 48.* 1901. "In pratis collinis et montanis prov. Córdoba et Salta." The type has not been examined.

BOLIVIA: Tarija, *Fries* 1308.
ARGENTINA: Andalgalá, *Jörgensen* 1256. Capilla del Monte, *Estrada* 18997.

8. Stipa tortuosa Desv.

Stipa tortuosa Desv. in Gay, Fl. Chil. **6**: 281. 1853. "Cordilleras de Doña Ana (Gay)." Dr. Lecomte has kindly sent a fragment from the type in the Paris Herbarium.

Culms zigzag at base, puberulent; fruit 5 to 6 mm. long, long-pilose toward summit.

CHILE: Atacama, *Philippi*; *Morong* 1133. Antofagasta, *Rose* 19415. Monte Amargo, *Philippi* 107. Morro de Caldera, *Philippi* 542.

9. Stipa papposa Nees.

Calamagrostis plumosa Spreng. Syst. Veg. **1**: 253. 1825. Not *Stipa plumosa* Trin. "Monte Video. Sello." The type specimen (or a duplicate) is in the U. S. National Herbarium, having been received among duplicates from the Berlin Herbarium. It is labeled in Sprengel's hand, the name being followed by an asterisk, as was his custom in indicating new species. The specimen came originally from the Kurt Sprengel Herbarium.

Stipa papposa Nees, Agrost. Bras. 377. 1829. "Ad Monte-Video. (Sellow.—Vidi in Herb. Reg. Berol.)." The type in the Berlin Herbarium, has been examined. It is another specimen of the same collection as the type of *Calamagrostis plumosa* Spreng.

This species can be distinguished by the long hairs on the upper third of the slender fruit. The awn is naked.

URUGUAY: Montevideo, *Arechavaleta* 15, 186; *Sellow*.
ARGENTINA: Sierra de la Ventana, *Dusén* in 1904. Buenos Aires, *Parodi* 320. Without locality, *Stuckert* 14068.
CHILE: Cueva, *Philippi* 97. Valparaíso, *Wilkes Expl. Exped.* 3.

10. **Stipa dusenii** Hitchc., sp. nov.

Culms erect, cespitose, glabrous, 40 to 80 cm. tall; sheaths glabrous, somewhat villous at the throat; blades closely conduplicate, rigid and wiry, terete, about as long as the culm or some of them longer, 0.5 to 1 mm. thick when rolled, glabrous on the back, more or less pilose with scattered hairs along the margin, pungently pointed; panicle narrow, 10 to 20 cm. long, the branches erect or ascending, floriferous from base, the shorter pedicels about 1 mm. long; glumes equal, thin, pale or purplish, gradually acuminate to a soft slender point, 8 to 9 mm. long, 3-nerved; lemma fusiform, pale, 5 to 6 mm. long, appressed-villous, the hairs about 1 mm. long, those at the apex as much as 3 mm. long, the callus short and thick, less than 1 mm. long, acute; awn twisted, twice-geniculate, slender, minutely scabrous 3 to 3.5 cm., the first segment about 7 mm. long, the second about 6 mm. long, the third straight, about 2 cm. long.

Type in the U. S. National Herbarium, no 1,161,165, collected on plains, Sierra de la Ventana, Province of Buenos Aires, Argentina, November 11, 1904, by P. Dusén. The only other specimen seen is from Peninsula de Valdés, Chubut, *Parodi* 5054.

This species was described under "*Stipa caudata* Trin." by Spegazzini[2] in Stipae Platenses, but is not *S. caudata* Trin. (see page 283).

11. **Stipa capilliseta** Hitchc., sp. nov.

Culms erect, cespitose, glabrous, slender, 50 cm. tall; sheaths glabrous, sparsely long-villous at the throat; ligule less than 1 mm. long; blades involute, long and slender, much narrower than the summit of the sheath, scabrous, erect, 10 to 20 cm. long, 0.5 mm. thick when rolled; panicle narrow, dense and almost spikelike, 10 to 15 cm. long, the branches appressed; glumes subequal, 5 to 6 mm. long, thin and hyaline, narrow, acuminate, faintly 3-nerved, minutely scabrous, sometimes purplish-tinged; lemma 5 mm. long, the callus sharp but very short, scarcely 0.5 mm. long, the body fusiform, narrowed above into a slender neck about 1 mm. long, rather sparsely villous all over, the hairs appressed below, those toward the summit ascending and longer, as much as 2 mm. long; awn very slender, scaberulous, about 2 cm. long, slightly twisted below, flexuous above, scarcely geniculate.

Type in the U. S. National Herbarium, no. 1,099,305, collected at Chiguana, Bolivia, altitude 3,700 meters, March 23, 1921, by Dr. E. Asplund (no. 6566). The type is the only specimen seen.

12. **Stipa nardoides** (Phil.) Hack. in herb.

Danthonia nardoides Phil. Anal. Mus. Nac. Chile Bot. **8**: 84. 1891. "Inter Amincha et Paroma lecta [Philippi, Tarapacá, Chile]." In the Hackel Herbarium at Vienna there is a portion of the type, bearing the name in Philippi's hand. On this Hackel has written, *Stipa nardoides* Hack.

Stipa pachypus Pilger, Bot. Jahrb. Engler **56**: Beibl. **123**: 25. 1920. "Peru: Mollendo * * * Weberbauer n. 1487." The type has been examined in the Berlin Herbarium.

The leaves are woolly at base of the involute blades and around the throat of the sheaths. In the type of *S. nardoides* the glumes are purple; they are greenish or tawny in the type of *S. pachypus* and in all the other specimens cited.

BOLIVIA: Uyuni, alt. 3,700 meters, *Asplund* 6539.
PERU: Mollendo, *Rose* 19535; *Weberbauer* 1487; *Hitchcock* 22350.

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[2] Anal. Mus. Nac. Montevideo **4**: 109. 1901.

13. **Stipa hans-meyeri** Pilger.

Stipa nivalis Steud.; Lechl. Berb. Amer. Austr. 56. 1857. Nomen nudum. Based on *Lechler* 1978 from Peru, which has been examined in the Vienna Herbarium.

Stipa hans-meyeri Pilger, Bot. Jahrb. Engler **56**: Beibl. **123**: 24. 1920. "Ecuador: Chimborazo, Paramo-Region, 4500 m. ü. m. (Hans Meyer n. 139. Juni 1903)." Dr. Pilger has kindly sent a fragment from the type specimen.

PERU: Sandía, *Weberbauer* 1025. Cuyo Cuyo, *Weberbauer* 940. Río Blanco, *Macbride & Featherstone* 803. Cerro de Pasco, *Hitchcock* 22241.

BOLIVIA: Between La Cumbre and Yungas, alt. 4,650 meters, *Asplund* 6513, 6515. Comanche, Berg Miriquiri, alt. 4,200 meters, *Asplund* 6544. Sorata, *Mandon* 1272 bis. Pongo, Nor-Yungas, *Hitchcock* 22777.

14. **Stipa rosea** Hitchc., sp. nov.

Culms erect, cespitose, glabrous, 50 to 60 cm. tall; sheaths glabrous; ligule firm, 3 to 4 mm. long; blades firm, closely involute, glabrous, 20 to 30 cm. long, less than 1 mm. in diameter; panicles narrow, rose-tinged, 12 to 20 cm. long, rather loosely flowered, the branches ascending, not much overlapping, slender, terete, glabrous, the pedicels terete, scaberulous under a lens; glumes about 7 mm. long, acuminate, rose-tinged in the middle part, the nerves obscure; lemma about 3 mm. long including the pubescent (0.5 mm. long) callus, fusiform, somewhat flattened, pilose on the keel, glabrous on the sides above, the summit bearing a dense tuft of hairs about 3 mm. long; awn flexuous or obscurely twice-geniculate, scarcely twisted, minutely scaberulous, about 1 cm. long.

Type in the U. S. National Herbarium, no. 1,197,850, collected in open ground, between San Lucas and Oña, Province of Loja, Ecuador, September 7, 1923, by A. S. Hitchcock (no. 21523). The type collection is the only one seen.

15. **Stipa plumosa** Trin.

Stipa plumosa Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. **2**[1]: 37. 1836. "V. sp. Chil." The type, in the Trinius Herbarium, was collected by Cuming.

Stipa plumosula Nees; Steud. Syn. Pl. Glum. **1**: 127. 1854. "Cuming legit in Chili." The type has been examined in the Berlin Herbarium.

The panicle is rather dense, the awns plumose from base.

PERU: Obrajillo, *Wilkes Expl. Exped.* Ollantaytambo, *Hitchcock* 22557; *Cook & Gilbert* 684. Matucana, *Macbride & Featherstone* 137.

BOLIVIA: Comorapa, *Herzog*, 1855. Summit of railroad east of Oruro, *Hitchcock* 22870.

ARGENTINA: Andalgalá, *Jörgensen* 1710.

CHILE: Santiago, *Philippi* in 1888, 596; *Claude Joseph* 116; *Hastings* 131. Atacama, *Philippi* 541. Coquimbo, *Philippi* 74. San Felipe, *Claude Joseph* 2339.

16. **Stipa neaei** Nees.

Stipa neaei Nees; Steud. Syn. Pl. Glum. **2**: 126. 1854. "In Berkeley Sound ad Portum Desideratum, Patagonia." [Falkland Islands.] The type has been examined in the Berlin Herbarium.

ARGENTINA: Puerto San Antonio, *Dusén* 5228 in part.

17. **Stipa pogonathera** Desv.

Stipa pogonathera Desv. in Gay, Fl. Chil. **6**: 277. 1853. "Provincia de Coquimbo, en los Patos, à 2,377 m. (Gay)." The type has not been examined but the description identifies the species.

Stipa uspallatensis Hack. Oesterr. Bot. Zeitschr. **54**: 289. 1904. Not *S. uspallatensis* Speg. 1901. "Juncal (2400 m. s. m.) am Uspallata-Pass der chilenischen Hoch-Cordillere (33 S. B.), gesammelt von Dr. Otto Buchtien (I–II. 1903)". The type has been examined in the Hackel Herbarium at Vienna.

Stipa buchtienii Hack. Oesterr. Bot. Zeitschr. **54**: 382. 1904. Based on *S. uspallatensis* Hack.

This species differs from *S. plumosa* in the longer sickle-shaped awns, glabrous or nearly so below the bend.

CHILE: Santiago, *Hastings* 547; *Claude Joseph* 617. Juncal, *Buchtien* in 1903. Coquimbo, *Philippi* in 1888. Tulahuen, *Philippi* 73. Quebrada Ramón, *Claude Joseph* 1783, 2341. Tiltel, *Philippi* 86. San Felipe, *Claude Joseph* 2501.

18. **Stipa argentea** Hitchc., sp. nov.

Plants perennial; culms erect, closely cespitose, puberulent at least below, 20 to 40 cm. tall; sheaths more or less retrorsely roughened, the lowermost sometimes puberulent, villous at the throat and in a line across the collar, the upper 1 or 2 inflated; ligule short on the innovations, as much as 4 mm. long on the culms; blades involute, firm, sharp-pointed, puberulent or glabrate on the outer surface, 3 to 5 cm. long (vigorous innovations not seen), less than 1 mm. thick when rolled; panicles narrow, inclosed at base in the uppermost sheath, less than 10 cm. long; the branches ascending, villous; glumes thin, hyaline, narrow, gradually acuminate into a soft awnlike point, 2 to 2.5 cm. long, the upper a little longer, 3 to 5-nerved; lemma about 1 cm. long, the callus sharp, 2 mm. long, white, pubescent with stiff white hairs, the body somewhat fusiform, brown, loosely villous with white hairs about 1 mm. long, the narrowed summit whitish and glabrous for about 1 mm.; awn sickle-shaped, the first segment about 2 cm. long, twisted, loosely plumose with ascending hairs about 3 mm. long, the second segment arcuate, about 6 cm. long, silvery, plumose like the first segment but more densely so, the hairs progressively shorter toward the glabrous apex.

Type in the U. S. National Herbarium, no. 1,126,751, collected "in campo," Puerto San Julián, Argentina, December 19, 1904, by P. Dusén (no. 5383A).

The type specimen was obtained in exchange from the Vienna Herbarium. It is a single culm about 30 cm. tall.

Two other specimens, both from Argentina, belong to this species. One, collected by Nicolás Illin (no. 244) in Chubut, region of the Río Corcovado, is mixed with a plant of *Stipa humilis*. The second was collected by L. Dauber (no. 2573 in herb. Parodi) along the Río Gallegos.

19. **Stipa charruana** Arech.

Stipa charruana Arech. Anal. Mus. Nac. Buenos Aires **4**: 181. *f. 3*. 1895. "Muy común en la República, en terrenos arcillosos, bajos y húmedos."

Characterized by the prominent membranous appendage extending beyond the summit of the fruit and embracing the base of the awn.

URUGUAY: Montevideo, *Arechavaleta; Parodi* 4778.

20. **Stipa melanosperma** Presl.

Stipa melanosperma Presl, Rel. Haenk. **1**: 226. 1830. "Hab * * *" See page 232 for notes on this species.

Stipa melanosperma var. *erythrina* Hack. Repert. Nov. Sp. Fedde **6**: 345. 1909. "Paraguay: * * * fluminis Yhú. * * * Hassler no. 9469."

BRAZIL: Paraná, *Dusén* 10874.

PARAGUAY: Sierra de Amambay, *Hassler* 12090. Alto Paraná, *Fiebrig* 6012.

21. Stipa depauperata Pilger.

Stipa leptothera var. *atroviolacea* Hack. Repert. Nov. Sp. Fedde **6**: 154. 1908. "Bolivia: La Paz, * * * Buchtien (no. 855)."

Stipa depauperata Pilger, Bot. Jahrb. Engler **56**: Beibl. **123**: 23. 1920. "Peru: Südlich von Sumbay * * * 4000 m (Weberbauer n. 6903)."

Stipa depauperata var. *glabrata* Pilger, Bot. Jahrb. Engler **56**: Beibl. **123**: 23. 1920. "Peru: Cordillera negra über Caraz, Dep. Ancachs * * * 4200 m ü. m. (Weberbauer n. 3076)."

Stipa depauperata var. *humilis* Pilger, Bot. Jahrb. Engler **56**: Beibl. **123**: 23. 1920. "Peru: Dep. Junin, La Oroya; * * * 4300 m ü. m. (Weberbauer n. 2615)."

Stipa pumila Mez, Repert. Nov. Sp. Fedde **17**: 205. 1921. "Bolivia, Palca-La Paz (Pflanz)." The type has not been examined.

PERU: Sumbay (Arequipa-Puno), *Weberbauer* 6903. Caraz (Ancash), *Weberbauer* 3076. La Oroya (Junín), *Weberbauer* 2615.

BOLIVIA: La Paz, *Buchtien* 855; *Holway* 492. Calacota, *Asplund* 6565.

ECUADOR: Alausí, *Hitchcock* 20708, 20712. Cotapaxi Station, *Hitchcock* 20774.

22. Stipa philippii Steud.

Stipa philippii Steud. Syn. Pl. Glum. **1**: 125. 1854. "Festuca nr. 97. Hrbr. chil. Dr. Philippi. Ad. Osorno Chili." In the U. S. National Herbarium there is a fragment from Lechler's no. 97.

The species appears to be allied to *S. illimanica* Hack. but differs in having a distinct crown to the fruit. Awn twice-geniculate, glabrous, 2.5 cm. long.

CHILI: Valdivia, *Philippi*.

23. Stipa lenta Hitchc., sp. nov.

Culms erect, slender and wiry, glabrous, 60 to 80 cm. tall; sheaths glabrous, much shorter than the internodes; ligule obtuse, glabrous, about 1 mm. long; blades erect, flat or loosely involute, glabrous or nearly so, 15 to 20 cm. long, about 2 mm. wide; panicle narrow, about 15 cm. long, the glabrous axis and ascending scaberulous branches slender, the pedicels 1 to 2 mm. long, scabrous, enlarged toward summit; glumes thin, narrow, equal, long-acuminate, pale, 3-nerved, about 6 mm. long; lemma 4 mm. long, the callus sharp but short, a little less than 1 mm. long, pubescent, the body brownish, rather sparsely villous all over, narrowed into a short smooth ciliate crown about 0.3 mm. long; awn twice-geniculate, twisted below, glabrous or nearly so, slender, about 2.5 cm. long.

Type in the U. S. National Herbarium, no. 825,103, collected at Valdivia, Chile, by R. A. Philippi. The type is the only specimen seen.

24. Stipa karsteni Hitchc., sp. nov.

Culms loosely cespitose and somewhat spreading at base, erect, glabrous, rather stout, about 3-noded, 50 to 60 cm. tall; sheaths glabrous, pubescent at the throat, shorter than the internode; ligule very short, about 0.3 mm. long; blades flat or loosely involute, slightly cordate at base, glabrous beneath, scabrous-pubescent on the upper surface, 10 to 15 cm. long, 2 to 4 mm. wide; panicle narrow, loose, 8 to 15 cm. long, the axis terete, glabrous, the lower internode as much as 7 cm. long, the branches ascending, angled, scabrous, the longest as much as 8 cm. long, naked at base, with several shorter spikelet-bearing ones at base, the lateral pedicels 1 to 2 mm. long, enlarged at summit, scabrous, pubescent; glumes subequal, rather firm, glabrous, acuminate, 3-nerved, tinged with violet below, about 9 mm. long; lemma about 4.5 mm. long, the callus 1 mm. long,

sharp, pubescent, the body pale, short-villous, sparingly so near summit, somewhat narrowed into a glabrous neck about 0.3 mm. long, ciliate with a few erect hairs nearly 1 mm. long; awn twice-geniculate, short-villous with ascending hairs below, about 1.5 cm. long, the first segment about 3 mm. long.

Type in the U. S. National Herbarium, no. 1,126,745, collected at Bogotá, Colombia, by H. Karsten. The type is the only specimen seen.

25. **Stipa brachyphylla** Hitchc., sp. nov.

Culms cespitose, erect, glabrous, 20 to 40 cm. tall; the uppermost node mostly near the base; sheaths glabrous; ligule very short on the innovations, 2 to 5 mm. long on the culms, firm; blades involute, firm, sharp-pointed, glabrous on the under surface, scabrous on the upper surface, the basal cluster mostly 5 cm. long or less, the uppermost culm-blade usually shorter; panicle well-exserted, narrow, rather loose, 3 to 10 cm. long, the axis glabrous, the branches glabrous, ascending, the lowermost as much as 4 cm. long, 1 or 2 naked on the lower half with 1 or 2 spikelet-bearing branches at base, the nodes sometimes obscurely villous; glumes subequal, about 1 cm. long, purple with hyaline tips, broad, rather abruptly acuminate, glabrous, the first 3-nerved, the second 5-nerved; lemma 6 mm. long, the callus sharp, 1.5 mm. long, pubescent with appressed hairs, the body oblong-fusiform, brownish, sparsely villous to summit, rather abruptly contracted to a crown 0.3 mm. long; awn twice-geniculate, about 2 cm. long, the first segment 5 mm. long, twisted, pubescent with short hairs, the second segment about as long as the first but less pubescent, the third straight, scabrous, 1 cm. long.

Type in the U. S. National Herbarium, no. 1,099,323, collected on mountain slopes, at La Paz, Bolivia, altitude 3,800 meters, March 28, 1907, by Dr. Otto Buchtien (no. 858).

The type specimen is labeled by Professor Hackel, *S. leptothera* Speg. var. *atroviolacea* Hack., but is not the same as the type specimen of that variety (*Buchtien* 855. See page 274.)

The other specimens of this species examined are:

ECUADOR: Between Oña and Cuenca, *Hitchcock* 21590.

PERU: Río Blanco, *Macbride & Featherstone* 669. Cerro de Pasco, *Hitchcock* 22226, 22243. Oroya, *Hitchcock* 22183. Tarma, *Hitchcock* 22161. Between Juliaca and Cuzco, *Hitchcock* 12444.

BOLIVIA: Isla del Sol (Titicaca), alt. 3,850 meters, *Asplund* 6557. La Paz, *Buchtien* 858; *Holway* 433.

ARGENTINA: Salta, Nevada del Castillo, *Hieronymus & Lorentz* 74 (a).

The last cited specimen (labeled *Nassella caespitosa* Griseb.) is different from the no. 74 cited under *S. inconspicua*.

26. **Stipa mexicana** Hitchc.

Colombia, Venezuela, Peru. See page 247.

27. **Stipa megapotamia** Spreng.

Stipa megapotamia "Sprgl. ms."; Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 1: 77. 1830. "V. sp. Brasil. merid." The type, in the Trinius Herbarium, is labeled "*Stipa megapotamia* Spr. Montevideo." It is from Otto and determined by Sprengel. The fruit is about 5 mm. long.

Stipa latifolia Hack. & Arech. Anal. Mus. Nac. Buenos Aires 4: 183. *f. 4.* 1895. Not *S. latifolia* Rasp. 1825. "En peñascales de Independencia [Uruguay]." The type has been examined in the Hackel Herbarium.

URUGUAY: Montevideo, *Arechavaleta*.

28. Stipa lachnophylla Trin.

Stipa lachnophylla Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. **2**[1]: 39. 1836. "V. sp. Chil." The type, in the Trinius Herbarium, is marked "Chili Cuming an Prescott 1832" and "(Stipa Cumingiana β)."

Stipa cumingiana Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. **2**[1]: 40. 1836. "V. sp. Chil." The type, in the Trinius Herbarium, was collected by Cuming and sent to Trinius by Prescott in 1832.

Stipa cumingiana β lachnophylla Trin. & Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. **5**[1]: 29. 1842. Based on *S. lachnophylla* Trin.

CHILE: Salto de Conchali, *Reiche* 96. Santiago, *Philippi* 95, 544. Catapilco, *Philippi* 78.

29. Stipa clarazii Ball.

Stipa clarazii Ball, Journ. Linn. Soc. Bot. **21**: 237. 1884. "Bahia Blanca (No. 21, M. Georges Claraz)." The type has not been examined.

URUGUAY: Montevideo, *Arechavaleta* 278.

ARGENTINA: Puerto Grande, *Stuckert* 15449. Sierra de la Ventana, *Dusén* 6035. Buenos Aires, *Parodi* 3975.

30. Stipa longiglumis Phil.

Stipa longiglumis Phil. Linnaea **33**: 286. 1864. "Prope 'Llico' in parte litorali prov. Colchaguae ab orn. Landbeck lectum vidi." In the U. S. National Herbarium is a specimen from the Philippi Herbarium which appears to be a duplicate type. It is from Llico, no. 79, and is dated December, 1861, but the collector is not given.

31. Stipa poeppigiana Trin. & Rupr.

Stipa poeppigiana Trin. & Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. **5**[1]: 29. 1842. "Chile australis andina pr. Antuco (Pöppig! pro St. eminente Cav. missa)." The type, in the Trinius Herbarium, is labeled "Pl. Chil. III. 20 (46)" in addition to the other data.

Stipa julieti Phil. Anal. Univ. Chile **93**: 719. 1896. "Ad flumen maullin in provincia Llanquihue legit orn. Dr. Carolus Juliet." The type, in the Philippi Herbarium, has been examined.

Stipa montana Phil. Anal. Univ. Chile **93**: 723. 1896. "In Andibus provinciae Valdivia loco dicto Pirihuaico invenit Otto Philippi." The type, in the Philippi Herbarium, has been examined.

Stipa latifolia var. *grandiflora* Hack.; Stuck. Anal. Mus. Nac. Buenos Aires **21**: 76. 1911. The type, Stuckert no. 17982, collected by Illin (no. 193) at Cholila, Chubut, Argentina, was examined in the Hackel Herbarium. The fruit is like that of *S. mucronata*, but is about 8 mm. long; the awn is about 4.5 cm. long; the blades about 8 mm. wide.

Resembling *S. neesiana;* fruit about 8 mm. long, sparingly villous, at least in lines, nearly to summit; crown rather indistinct, not constricted at base, the body gradually narrowed into the crown.

CHILE: Cordilleras bajas de Carico, *Reiche* 94 in 1897.

32. Stipa curicoana Phil.

Stipa curicoana Phil. Anal. Univ. Chile **93**: 726. 1896. "In provincia Curicó [Chile] invenit Man. Vidal, 1892." In the U. S. National Herbarium is a photograph of the type in the Philippi Herbarium, and a fragment of the inflorescence. No other specimen has been seen.

33. Stipa laxa Desv.

Stipa laxa Desv. in Gay, Fl. Chil. **6**: 283. 1853. "Chile (Cl. Gay)." Doctor Lecomte has kindly sent from the Paris Herbarium a fragment of the type, labeled "Chili (Gay)." It is a good match for *Hastings* 177.

CHILE: Santiago, *Hastings* 177.

34. Stipa mucronata H. B. K.

Colombia, Venezuela, Ecuador, Peru, Bolivia, Argentina, Chile. See page 223.

35. Stipa tenuis Phil.

Stipa tenuis Phil. Anal. Univ. Chile **36**: 204. 1870. "Mendoza." A specimen of the type collection was examined at the Vienna Herbarium.

ARGENTINA: Puerto Martyn, Chubut, *Pennington* 60.

36. Stipa hyalina Nees.

Stipa hyalina Nees, Agrost. Bras. 378. 1829. "Habitat ad Monte Video (Sellow.—Vidi in Hb. Reg. Berol.)." The type, *Sellow* 636d, in the Berlin Herbarium, bears the name in Nees' script. In the U. S. National Herbarium are two sheets from the Berlin Herbarium marked "Brasilia, Sello." These may be from the type collection, and should be credited to Uruguay.

URUGUAY: Montevideo, *Sellow; Arechavaleta.*

ARGENTINA: Córdoba, *Stuckert* 12675, 12924, 16115; *Hieronymus* 278. San Teodoro, *Stuckert* 13666.

37. Stipa juergensii Hack.

Stipa juergensii Hack. Repert. Nov. Sp. Fedde **7**: 314. 1909. "Brasilia, Rio Grande do Sul, Municipio Rio Pardo, Fazenda Soledade, 70 m s. m. leg. C. Jürgens, an. 1905." The type in the Hackel Herbarium is numbered G110.

BRAZIL: Rio Grande do Sul, *Jürgens.*

38. Stipa trichocaulos Phil.

Stipa trichocaulos Phil. Anal. Univ. Chile **93**: 718. 1896. "In praedio meo San Juan (provinciae Valdiviae)." The type was examined in the Philippi Herbarium.

CHILE: Valdivia, *Philippi* 98. Peumo, *Claude Joseph* 1413. San Fernando, *Claude Joseph* 2340.

39. Stipa papillosa (Hack.) Hitchc.

Stipa tenuis var. *papillosa* Hack. in Stuck. Anal. Mus. Nac. Buenos Aires **21**: 83. 1911. Of the six specimens cited the only one in the Hackel Herbarium is Stuckert no. 18996, which is the type. This was collected by Estrada at Capilla del Monte, Córdoba. The fruit is 7 mm. long.

ARGENTINA: Córdoba, *Stuckert* 19003 (fruit 9 mm. long), 18996.

40. Stipa hackeli Arech.

Stipa neesiana var. *ligularis* Griseb. Abh. Ges. Wiss. Göttingen **24**: 298. 1879. Province of Entrerios. The type, *Lorentz* 1158, was examined in the Grisebach Herbarium.

Stipa hackeli Arech. Anal. Mus. Nac. Buenos Aires **4**: 173. *f. 2.* 1895. "Cerro de Montevideo, cerca de la cumbre." In the Hackel Herbarium is a specimen, probably a part of the type, with the name in Arechavaleta's hand.

Oryzopsis napostaensis Speg. Anal. Mus. Nac. Montevideo **4**: 15. 1901. (Stipeae Platenses). "In aridis australioribus prov. B. Aires inter Sierra de Curá-malal

et Río Negro." The type has not been examined, but the figure and full description identify the species. The terete, glabrous, minutely striated fruit, papillose at apex, is characteristic.

Stipa sublaevis Speg. Anal. Mus. Nac. Montevideo **4**: 82. 1901. "Hab. In campis graminosis prope Mar del Plata * * * et Sierra Curá-malal * * *". The type has not been examined.

Stipa ligularis Speg. Anal. Mus. Nac. Montevideo **4**: 91. *f. 21*. 1901. Based on *S. neesiana* var. *ligularis* Griseb.

Stipa capillifolia Hack. in Stuck. Anal. Mus. Nac. Buenos Aires **11**: 95. 1904. "Stuckert: Herb. arg. no. 13,803 et no. 14,082." The two specimens cited, of which the first may be considered the type, are in the Hackel Herbarium, both from the Province of Córdoba.

Piptochaetium napostaense Hack.; Stuck. Anal. Mus. Nac. Buenos Aires **11**: 103. 1904. Based on *Oryzopsis napostaensis* Speg.

URUGUAY: Montevideo, *Osten* 5648; *Arechavaleta* in 1894.

ARGENTINA: Andalgalá, *Jörgensen* 1111. Mendoza, *Gillies*. Pergamino, *Parodi* 80. Mercedes, *Parodi* 491. Choele-Choel, *Parodi* 2550. Córdoba, *Stuckert* 13803, 14082, 15223.

There is some diversity in the specimens referred to this species. The type of *S. hackeli* is more robust, the fruits are larger (about 1 cm.), and the awns are longer (the first section 5 to 6 cm.) The type of *S. capillifolia* is a slender plant, with fruits about 7 mm. long and the first section of the awn about 1.5 cm. long. The others are intermediate, but all have brown fruits densely pilose on the slender callus, smooth and striate on the cylindrical body, and papillose-scabrous on the rounded summit. Dr. L. R. Parodi, who has studied the species in the vicinity of Buenos Aires, considers *S. hackeli* and *Oryzopsis napostaensis* to be distinct species and sends the following field notes: "The first has a few-flowered inflorescence with the first glume 22 to 30 mm. long, the robust almost black fruit 11 to 12 mm. long; the second has an inflorescence with more spikelets, the first glume about 18 mm. long, and the light brown softer fruit 8 to 9 mm. long."

41. Stipa duriuscula Phil.

Stipa duriuscula Phil. Linnaea **33**: 282. 1864. "In prov. Colchagua [Chile] ab orn. Landbeck lecta sunt." The type has been examined in the Philippi Herbarium.

Stipa hirta Phil. Linnaea **33**: 283. 1864. "In colli prope Santiago inveni." The type has been examined in the Philippi Herbarium.

CHILE: Lampa, *Philippi* 103. Peumo, *Claude Joseph* 1428.

42. Stipa contracta Phil.

Stipa contracta Phil. Linnaea **33**: 285. 1864. "E Colchagua [Chile] attulit orn. Landbeck." The type has been examined in the Philippi Herbarium. No other specimen has been seen.

43. Stipa gilliesii Hitchc., sp. nov.

Culms erect, glabrous, slender, 40 to 50 cm. tall; sheaths glabrous, minutely pubescent at the throat and on the margin; ligule obtuse, about 1 mm. long; blades loosely involute (only the culm leaves seen), glabrous beneath, scabrous-pubescent on the upper surface, 3 to 5 cm. long or the uppermost shorter; panicle narrow, rather loose, 15 to 30 cm. long, the axis glabrous, villous at the lower nodes, the branchlets scabrous on the angles, the pedicels mostly glabrous, the branches rather loosely appressed, the longer ones naked at the base; glumes equal, purple except the hyaline tip and margin, glabrous, broad, abruptly nar-

rowed to an acute point, 3 or faintly 5-nerved, about 1 cm. long; lemma 6 to 7 mm. long, the callus sharp, about 1 mm. long, villous-hispid, the body glabrous, slender, pale, villous about halfway up on one side, smooth below, minutely papillose toward summit, narrowed into a rather indistinct hispid-ciliate crown 0.3 mm. long; awn about 2.2 cm. long, twice-geniculate, the first segment 8 mm. long, villous with ascending hairs 1 mm. long, the second segment 4 mm. long, the third 1 cm. long.

Type in the U. S. National Herbarium, no. 993,517, collected at Mendoza, Argentina, by Gillies (no. 1825). The type is the only specimen seen.

44. Stipa nutans Hack.

Stipa nutans Hack. Repert. Nov. Sp. Fedde **7**: 315. 1909. "Brasilia, Rio Grande do Sul, Municipio Rio Pardo, Fazenda Soledade (70 m s. m.), Dec., 1905, leg. C. Jürgens." The type has been examined in the Hackel Herbarium. BRAZIL: Rio Pardo, Rio Grande do Sul, *Jürgens* in 1905.

45. Stipa macrathera Phil.

Stipa fernandeziana Phil. Anal. Univ. Chile **48**: 560. 1873. Not *S. fernandeziana* Steud. 1854. "Isla de Juan Fernandez." The type (*Philippi* 87) has been examined. It differs from *S. neesiana* in the slender flexuous terminal segment of the awn. The fruit is 10 mm. long, glabrous, except for a line of hairs on one side, and is roughened on the body.

Stipa macrathera Phil. Anal. Univ. Chile **93**: 720. 1896. "In collibus de Renca dictis prope Santiago semel inveni." The type has been examined in the Philippi Herbarium.

No specimens besides the types have been seen.

46. Stipa fernandeziana (Trin. & Rupr.) Steud.

Stipa neesiana γ fernandeziana Trin. & Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. **5**[1]: 28. 1842. "Ins. Juan Fernandez (Prescott.)." The type has been examined in the Trinius Herbarium.

Stipa fernandeziana Steud. Syn. Pl. Glum. **1**: 124. 1854. Based on *S. neesiana* var. *fernandeziana* Trin. & Rupr.

URUGUAY: Montevideo, *Arechavaleta* 20. Without locality, *Lorentz* 485.
ARGENTINA: Puerto Grande, Córdoba, *Stuckert* 15449.
CHILE: Panamavida, *Holway* 211. Province Maule, *Philippi* 548. Juan Fernández, *Skottsberg* 19, 28; *Hastings* 242. San Rosendo, *Claude Joseph* 1943.

47. Stipa barbinodis Phil.

Stipa barbinodis Phil. Anal. Univ. Chile **93**: 721. 1896. "Habitat in provincia Valdivia [Chile] (in praedio S. Juan, etc.)." The type was examined in the Philippi Herbarium. No other specimen has been seen.

48. Stipa neesiana Trin. & Rupr.

Stipa neesiana Trin. & Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. **5**[1]: 27. 1842. "Monte Video (Sellow!)." This is *S. eminens* as described by Nees,[3] but not *S. eminens* Cav. The type, in the Trinius Herbarium, has been examined. The fruit, including the callus (3 mm.), is 8 mm. long, glabrous above the callus except for a line of pubescence extending upward on the keel about half-way, the crown distinct, 1 mm. long, sharply toothed rather than hispid-ciliate, the

[3] Agrost. Bras. 374. 1829.

body somewhat constricted below the crown, papillose, expecially toward the crown; awn about 5 cm. long, scaberulous-hispidulous or nearly glabrous.

Stipa neesiana β chilensis Trin. & Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. **5**[1]: 28. 1842. "Chile. Lindley." The type, in the Trinius Herbarium, is marked "Chile misit Lindley."

Stipa manicata Desv. in Gay, Fl. Chil. **6**: 288. 1853. "En los peñascos de Santiago, Setiembre 1829 (Gay)." Dr. Lecomte has kindly sent me a fragment from the type specimen in the Paris Herbarium, collected "ad rupas, Santiago, September 1829 (Gay)," Chile. Glumes 10 and 12 mm. long, awn-pointed, scabrous on the keel; fruit 7.5 mm. long, the densely pubescent callus about 2 mm. long, the body somewhat fusiform, pubescent on the keel about halfway up, otherwise glabrous, papillose-roughened, especially toward the summit, the neck about 1 mm. long, purplish, not very distinct, not constricted below, ciliate at summit with hairs 1 mm. long; awn slender, twice-geniculate but the bend weak, the awn as a whole nearly straight, the first segment 12 mm. long, scabrous-pubescent, the second segment about 1 cm. long, scaberulous, the third segment 2.5 cm. long. The type of *S. manicata* differs from the type of *S. neesiana* in having longer hairs on the crown and a somewhat shorter weaker awn, but other specimens are intermediate.

Stipa longiflora Steud. Syn. Pl. Glum. **1**: 124. 1854. "Urachne longiflora Steud. Hrbr. Bert. nr. 800." *Urachne longiflora* Steud. is listed[4] as a nomen nudum and "Andropogon. nr. 800. Bert. Herb." is cited. A duplicate of this is in the U. S. National Herbarium.

Stipa trachysperma Phil. Linnaea **33**: 284. 1864. "In collibus prope Santiago [Chile] inveni." The type has been examined in the Philippi Herbarium.

Stipa hispida Phil. Anal. Univ. Chile **93**: 719. 1896. "Prope Valparaiso in praedio Curauma legi." The type, in the Philippi Herbarium, has been examined.

Stipa setigera glabrata Arech.; Speg. Anal. Mus. Nac. Montevideo **4**: 97. 1901.

Stipa setigera hispidula Speg. Anal. Mus. Nac. Montevideo **4**: 97. 1901. Foliage pubescent. Spegazzini describes here three forms of this variety, *pallida*, *purpurascens* and *versicolor*.

Stipa neesiana f. *contorta* Hack.; Stuck. Anal. Mus. Nac. Buenos Aires **11**: 100. 1904. "Stuckert: Herb. arg. no. 12044." The type, in the Hackel Herbarium, has been examined.

Stipa neesiana var. *virescens* Hack.; Stuck. Anal. Mus. Nac. Buenos Aires **11**: 100. 1904. "Stuckert: Herb. arg. no. 12064." The type, in the Hackel Herbarium, has been examined.

Stipa neesiana f. *depauperata* Hack.; Stuck. Anal. Mus. Nac. Buenos Aires **21**: 78. 1911. "St[uckert] no. 19606. * * * Los Cocos Punilla, Argentina." The type, in the Hackel Herbarium, has been examined.

The species is related to *S. leucotricha* and *S. mucronata*, having a smooth cylindric neck, differentiated from the body of the lemma. In habit it resembles *S. mucronata*, but the awns are more robust and longer (mostly 5 to 8 cm.). The fruiting lemma is 7 to 8 mm. long, including the slender callus (3 mm.). The body is glabrate above the callus or pubescent in lines for a short distance, the upper part being roughened with minute points, the crown distinct.

ECUADOR: Quito, *Holmgren* 537. La Rinconada, *Hitchcock* 20809.
PERU: Cuzco, *Hitchcock* 22502, 22510.
URUGUAY: Montevideo, *Arechavaleta* 37a, 500a.
BOLIVIA: Cochabamba, *Holway* 328; *Hitchcock* 22850. Sorata, *Rusby* 237.

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[4] Steud. Nom. Bot. ed. 2. **2**: 731. 1841.

ARGENTINA: Azul, *Osten* 237. Sierras del Tandiel, *Parodi* 47. Río Segmundo, *Stuckert* 12032. Córdoba, *Stuckert* 3965, 11951; *Holway* 2020. Estancia San Teodoro, *Kneucker Gram. Exs.* 199; *Stuckert* 14064. Concepción, *Parodi* 2571. Escuela Santa Catalina, *Parodi* 324. Colonia Margarita, *Stuckert* 19229. Los Cocos, *Stuckert* 19606. Concordia, Entre Ríos, *Parodi* 3951.

CHILE: Santiago, *Claude Joseph* A149, 550; *Philippi* 599. Papudo, *Holway* 25. Constitución, *Holway* 134. Concepción, *Holway* 140. Viña del Mar, *Holway* 8. San Antonio, *Claude Joseph* 1774. Valparaíso, *Bertero* 800. Llico, *Philippi* 92. Zapillar, *Holway* 310.

49. **Stipa saltensis** Kuntze.

Stipa saltensis Kuntze, Rev. Gen. Pl. **3**: 372. 1898. "Argentina: Alrededores del Nevado del Castello, Pro. Salta (73 Lorentz & Hieronymus)." A specimen of the type collection was examined in the Vienna Herbarium.

ARGENTINA: Salta, *Lorentz & Hieronymus* 73; *Fries* 720.
CHILE: "Chile-Bolivia," *Philippi* 151.

50. **Stipa annua** Mez.

Stipa annua Mez, Repert. Nov. Sp. Fedde **17**: 204. 1921. "Peru, Berge bei Chosica (Weberbauer)." The type has been examined in the Berlin Herbarium. No specimen except the type has been seen.

51. **Stipa filifolia** Nees.

Aristida megapotamica Spreng. Syst. Veg. **4**: Cur. Post. 31. 1827. Not *Stipa megapotamia* Spreng.; Trin. 1830. "Rio grande. Sello." The description applies to a species of *Stipa* and not to a species of *Aristida*. The type, in the Berlin Herbarium, has been examined.

Stipa filifolia Nees, Agrost. Bras. 379. 1829. "Habitat ad Monte Video. (Sellow.—V. in Herb. Reg. Berol.)." The type, in the Berlin Herbarium, *Sellow* 803d, bears the name in Nees' script.

URUGUAY: "Brasilia meridionalis," *Sellow*. Montevideo, *Arechavaleta*.

52. **Stipa brevipes** Desv.

Stipa brevipes Desv. in Gay, Fl. Chil. **6**: 282. 1853. "Se halla en las provincias centrales de la República (Gay)." Dr. Lecomte has kindly sent a fragment from the type in the Paris Herbarium. No other specimen has been seen.

53. **Stipa leptostachya** Griseb.

Stipa leptostachya Griseb. Abh. Ges. Wiss. Göttingen **24**: 299. 1879. "S [alta]: Nevado del Castillo." The type *Lorentz & Hieronymus* 70, in the Grisebach Herbarium, has been examined.

ARGENTINA: Nevada del Castillo, Salta, *Lorentz & Hieronymus* 70.

54. **Stipa dasycarpa** Hitchc., sp. nov.

Culms erect, closely cespitose, glabrous, slender, 30 to 40 cm. tall; sheaths glabrous, puberulous at the throat; blades closely involute, glabrous beneath, puberulent on the upper surface, 8 to 15 cm. long, about 0.3 mm. thick when rolled; panicles narrow, 10 to 15 cm. long, the branches appressed or ascending, rather loosely flowered, the longer ones naked below; glumes equal, narrow, acuminate, purplish below, 3-nerved, 5 mm. long; lemma about 3 mm. long, the callus 0.5 mm. long, the body pale, loosely villous all over, narrowly fusiform;

awn about 2 cm. long, easily deciduous, slender, twice-geniculate, villous with appressed hairs on the first two segments, the first segment 5 mm. long, the second a little shorter, the third about 1 cm. long.

Type in the U. S. National Herbarium, no. 1,099,337, collected at Chiguana, Bolivia, altitude 3,700 meters, March 22, 1921, by Dr. E. Asplund (no. 6562). No specimens besides the type have been seen.

55. **Stipa violacea** Hitchc., sp. nov.

Culms erect, closely cespitose, glabrous, slender, 30 to 40 cm. tall; sheaths glabrous, a little villous at the throat; ligule about 0.5 mm. long; blades closely involute, glabrous, firm, erect, sharp-pointed, mostly less than 10 cm. long, about 0.5 mm. wide when rolled; panicles narrow, violet or purple, 5 to 10 cm. long, the branches erect or ascending, the axis, branches, and pedicels glabrous; glumes equal, rather broad, purple except the tips, abruptly narrowed to an acute point, rather firm, obscurely 3 to 5-nerved, 4 mm. long; lemma 3 mm. long, the callus 0.5 mm. long, the body brownish, villous all over, somewhat fusiform, the summit bearing an obscure crown 0.2 mm. long; awn early deciduous, twice-geniculate, scaberulous, 5 to 7 mm. long.

Type in the U. S. National Herbarium, no. 922,078, collected at Aconquija, Catamarca, Argentina, altitude 4,200 meters, April 12, 1907, by P. Jörgensen (no. 1763). No other specimens have been seen.

56. **Stipa litoralis** Phil.

Stipa litoralis Phil. Anal. Univ. Chile **93:** 717. 1896. "In litore arenoso insulae Quiriquinae [Chile] inveni." There is a duplicate type in the U. S. National Herbarium. No other specimen has been seen.

57. **Stipa curviseta** Hitchc., sp. nov.

Plant perennial; culms erect or somewhat geniculate at base, glabrous, 30 to 60 cm. tall; sheaths glabrous, or the lower puberulous, villous at the throat, especially on the innovations, nearly glabrous on the culm; ligule thin, decurrent, 1 to 3 mm. long; blades involute, glabrous or sometimes scaberulous on the outer surface, scabrous-ciliate on the margin, scabrous pubescent on the upper surface, 10 to 20 cm. long, the culm blades shorter, about 1 mm. wide when rolled, rigidly sharp-pointed, the base with a bowed-out callus on each side; panicle pyramidal, nodding, loose, 15 to 20 cm. long, the axis glabrous, the branches in distant verticils, slender, flexuous, more or less pubescent or scabrous, naked below, spikelet-bearing in the upper half, the lowermost about 5, as much as 10 cm. long, the lower internode of axis as much as 10 cm. long; spikelets appressed and somewhat crowded along the branches, the lateral pedicels about 2 mm. long; glumes narrow, nearly equal, about 1.5 cm. long, purple with hyaline long-acuminate tips; lemma slender, terete, about 8 mm. long, the callus slender and sharp, about 3.5 mm. long, villous with appressed hairs, the body loosely villous with somewhat appressed short hairs, or finally glabrate, at first pale, later brownish, the obscure crown ciliate; awn 5 to 7 cm. long, early deciduous, twice-geniculate, the first segment about 1 cm. long, twisted, villous with ascending hairs about 2 mm. long, the second segment like the first but shorter and less villous, the third segment 3 to 5 cm. long, flexuous, angled, gradually less villous toward the scabrous tip.

Type in the U. S. National Herbarium, no. 1,099,338, collected at Uyuni, Andean region of Bolivia, altitude 3,700 meters, March 24, 1921, by E. Asplund (no. 6551).

Other specimens, all collected in the vicinity of the type locality, are: Atocha, *Asplund* 6547, 6550; Chiguana, *Asplund* 6554.

58. Stipa stuckertii Hack.

Stipa stuckertii Hack. in Stuck. Anal. Mus. Nac. Buenos Aires **21**: 81. *pl. 3. f. A. B. C. a–f.* 1911. Collected at Quebrada de la Oyada, Estancia "Pampa de San Luis," Province Córdoba, Argentina (*Stuckert* no. 20737). The type has been examined in the Hackel Herbarium.

ARGENTINA: Córdoba, *Stuckert* 20737.

59. Stipa juncoides Speg.

Stipa juncoides Speg. Contr. Estud. Fl. Sierra Ventana 68. 1896. Described from Sierra Ventana, Province of Buenos Aires, Argentina. The type has not been examined.

URUGUAY: *Arechavaleta.*
ARGENTINA: Sierras del Tandil, *Parodi* 3144. Sierra de la Ventana, *Dusén*, 1904.

60. Stipa tenuiculmis Hack.

Stipa tenuiculmis Hack. Verh. Zool. Bot. Gess. Wien **1915**: 75. 1915. "Rio Grande do Sul: in campis prope Lagão. Municipio Soledade, C. Jürgens." The type was examined in the Hackel Herbarium.

BRAZIL: Soledad, Rio Grande do Sul, *Jürgens* in 1910.

61. Stipa rupestris Phil.

Stipa rupestris Phil. Anal. Mus. Nac. Chile Bot. **8**: 81. 1891. "In rupibus inter Amincha et Paroma c. 3800 m. s. m. reperta." The type, collected by Philippi in Province Tarapacá, has been examined.

CHILE: Province Tarapacá, *Philippi* 108.

62. Stipa featherstonei Hitchc.

Stipa featherstonei Hitchc. Proc. Biol. Soc. Washington **36**: 196. 1923. "Type in the herbarium of the Field Museum of Natural History, No. 517, 331(in part), collected on upland slope, about 4,500 meters altitude, Río Blanco, Peru, May 8 to 19, 1922, by Macbride and Featherstone (No. 803a)." No other specimen seen.

63. Stipa caudata Trin.

Stipa caudata Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. **1**: 75. 1830. "V. spp. Chilens." The type, in the Trinius Herbarium, sent to Trinius by Lindley, bears no other data. No other specimen has been seen.

64. Stipa macbridei Hitchc.

Stipa macbridei Hitchc. Proc. Biol. Soc. Washington **36**: 197. 1923. "Type in the herbarium of the Field Museum of Natural History, No. 561,986, collected on disintegrating rock slopes, at about 2,500 meters altitude, Matucana, Peru, April 12 to May 3, 1923, by Macbride and Featherstone (No. 452)."

PERU: Matucana, *Macbride & Featherstone* 452. Ambo, *Macbride* 3176.

65. Stipa flexibarbata Mez.

Stipa flexibarbata Mez, Repert. Nov. Sp. Fedde **17**: 208. 1921. "Argentina, Sierra Achala de Cordoba (Hieronymus)." The type, in the Berlin Herbarium, has been examined. No other specimen has been seen.

66. Stipa leucogluma Steud.

Stipa leucogluma Steud. Syn. Pl. Glum. **1**: 420. 1854. "R. A. Philippi pl. Chil. nr. 312. Valdivia." A specimen of the type collection has been examined

in the herbarium of the St. Petersburg Botanic Garden. A fragment is in the U. S. National Herbarium. No other specimen has been seen.

67. Stipa filiculmis Del.

Stipa filiculmis Del. Ind. Sem. Hort. Monsp. 7. 1849; Ann. Sci. Nat. III. **12**: 367. 1849. Described from plants cultivated in the Botanic Garden at Montpellier. The type has not been examined.

The blades are filiform, as in *S. filifolia*, but the panicle is loose and few-flowered.

URUGUAY: Montevideo, *Arechavaleta* 213.
ARGENTINA: San Francisco, *Parodi* 991.

68. Stipa hypogona Hack.

Stipa hypogona Hack.; Stuckert, Anal. Mus. Nac. Buenos Aires **21**: 73. 1911. "Stuckert, Herb. Arg. no. 17,397 * * * Estación Tornquist, F. C. S. Prov. Buenos Aires * * * Mario Estrada." The type in the Hackel Herbarium.

ARGENTINA: General Roca, *Fischer* 47. Bahía Blanca, *Clary*. Estación Tornquist, *Estrada* (*Stuckert* 17397). Cacheuta, *Spegazzini* 2391, 2393. Colonia Alvear, *Parodi* 4844.
CHILE: Valdivia, *Philippi* 80.

69. Stipa curamalalensis Speg.

Stipa curamalalensis Speg. Anal. Mus. Nac. Montevideo **4**: 160. *f. 49*. 1901. "Ad basin montis Curámalál grande."

Stipa tenuissima curamalalensis Hack.; Stuck. Anal. Mus. Nac. Buenos Aires **21**: 83. 1911. Based on *S. curamalalensis* Speg.

ARGENTINA: Balcarce, *Hauman* 5761.

70. Stipa breviculmis Hitchc., sp. nov.

Culms erect, closely cespitose, slender, glabrous, 10 to 20 cm. tall; sheaths glabrous, broader at summit than base of rolled blade, the throat glabrous; ligule firm, ovate, less than 1 mm. long; blades closely involute, capillary, stiff, more or less flexuous, scabrous, 5 to 10 cm. long, about 0.3 mm. thick when rolled; panicles narrow, 5 to 10 cm. long, the branches appressed, few-flowered, the axis, branches, and pedicels (about 2 mm. long), strongly scabrous; glumes 7 to 8 mm. long, subequal, purplish, 3-nerved, acuminate, awn-tipped, the nerves scabrous; lemma about 3.5 mm. long, the callus sharp, nearly 1 mm. long, hispidulous with white hairs, the body somewhat flattened, glabrous and shining, oblong, nearly 1 mm. wide, abruptly narrowed and asymmetric at summit; awn slender, about 2 cm. long, slightly twisted and obscurely twice-geniculate, scaberulous.

Type in the U. S. National Herbarium, no. 1,163,388, collected at Concepción, Chile, by R. A. Philippi (no. 106). Besides the type there is a specimen from Province Maule, *Philippi* 547.

71. Stipa obtusa (Nees & Mey.) Hitchc.

Piptatherum obtusum Nees & Mey. Act. Acad. Caes. Leop. Carol. **19**: Suppl. 1: 18. 1841 (advance separate), 150. 1843. Arequipa, Meyen in 1831.

Urachne obtusa Trin. & Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. **5**[1]: 22. 1842. Based on *Piptatherum obtusum* Nees & Mey.

Stipa boliviensis Hack. Repert. Nov. Sp. Fedde **11**: 21. 1912. "Bolivia: In planitie alta prope La Paz (alt. 4100 m s. m.), Mart. 1910, leg. Dr. O. Buchtien no. 2489." The type has been examined in the Hackel Herbarium.

BOLIVIA: La Paz, *Buchtien* 2489. Palca, *Pflanz* 2539.

72. Stipa rigidiseta (Pilger) Hitchc.

Oryzopsis rigidiseta Pilger, Bot. Jahrb. Engler **56**: Beibl. **123**: 26. 1920. "Peru: Depart. Puno, Azangaro; (Weberbauer n. 475.—Februar 1902)." Dr. Pilger has kindly contributed a part of the type to the U. S. National Herbarium. No other specimen has been seen.

73. Stipa peruviana Hitchc., sp. nov.

This species is allied to *S. boliviensis* Hack., but has larger fruits and longer awns. In the U. S. National Herbarium are fragments of Lechler's no. 1735, one from the Grisebach Herbarium and one from the Vienna Herbarium. This appears to be an undescribed species. The description appended is taken from the inflorescence only, but should identify the species. Steudel applied a name [5] to this, but gave no description.

Panicle narrow, the branches appressed, this and the axis and pedicels (the shorter ones 1 mm. long) puberulous or scabrous-puberulous; glumes somewhat unequal, 4 to 5 mm. long, purplish, rather firm, broad, rounded or acutish at apex, obscurely nerved, glabrous; lemma 4 mm. long, the callus sharp, about 0.5 mm. long, the body pale, fusiform, glabrous for the most part, sparingly pilose toward summit and along the ventral face; awn not twisted, falcate, scabrous or scabrous-pubescent, 1 to 2 cm. long, the base gradually widened and as wide as the summit of the lemma.

Type in the U. S. National Herbarium, no. 1,163,387, collected in Peru by Lechler (no. 1735). No other specimen has been seen.

74. Stipa venusta Phil.

Stipa venusta Phil. Anal. Mus. Nac. Chile Bot. **8**: 81. 1891. "De Socaire allata," collected by Philippi in Tarapacá. The type was examined in the Philippi Herbarium.

CHILE: Atacama Desert, *Reiche* 9 in 1901. Socaire in Desierto Atacama *Philippi*.

75. Stipa polyclada Hack.

Stipa polyclada Hack.; Stuck. Anal. Mus. Nac. Buenos Aires **21**: 80. 1911. The name appeared earlier without description.[6] The specimen in the Hackel Herbarium with this name is *Stuckert* 17118. Stuckert cites *Schickendantz* 315, *Stuckert* 17118 and 17615. Stuckert's no. 17118, which may be accepted as the type, is from "Quebrada del río de oro, Cerro de minas, Sierra de Ulapes, Dep. San Martín, Prov. Rioja."

ARGENTINA: San Martín, *Kneucker Gram. Exs.* 681; *Schickendantz* 315. Andalgalá, *Jörgensen* 1707. Catamarca, *Estrada* (*Stuckert* 17615).
BOLIVIA: Uyuni, *Asplund* 6563.

76. Stipa hirtifolia Hitchc., sp. nov.

Culms erect, cespitose, slightly scaberulous, 30 to 50 cm. tall; sheaths of the lower leaves, especially of the innovations, puberulent, the upper glabrate; ligule of the culm leaves about 1 mm. long, of the innovations very short; blades flat or loosely involute, hispid or villous, 5 to 10 cm. long, as much as 2 mm. wide; panicle narrow, rather loose, about 8 cm. long, the branches ascending, very scabrous or scabrous-pubescent; glumes subequal, rather broad, gradually acuminate to a slender point, purplish below, strongly 3-nerved, scaberulous on the keel, about 9 mm. long; lemma about 4 mm. long, the callus less than 1 mm.

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[5] Lechler, Berb. Amer. Austr. 56. 1857.
[6] Allg. Bot. Zeitschr. **14**: 77. 1908.

long, broad, pilose, the hairs extending over the lower third of the body, pale, the body oblong, somewhat compressed, glabrous and shining, pale, abruptly narrowed and asymmetric at summit, over 1 mm. wide; awn nearly straight, twisted below, obscurely geniculate, about 2 cm. long, pilose at base, scabrous-pubescent and finally scaberulous toward tip.

Type in the U. S. National Herbarium, no. 825,118, collected at Santiago, Chile, by R. A. Philippi. No other specimen has been seen.

77. **Stipa hirtiflora** Hack.

Stipa hirtiflora Hack. in Dusén, Ark. för Bot. **7**: 5. *pl. 3. 4.* 1908. "In valle rivuli Arroyo Pelque." The type, in the Hackel Herbarium, is *Dusén* 5640, Territory of Santa Cruz, Patagonia.

ARGENTINA: Santa Cruz, *Dusén* 5640. Lago Argentino (Santa Cruz), *Dusén* in 1905.

78. **Stipa ibarrensis** H. B. K.

Stipa ibarrensis H. B. K. Nov. Gen. & Sp. **1**: 125. 1816. "Crescit ad muros urbis Quitensis, Villa de Ibarra." Dr. H. Lecomte has kindly sent a spikelet from the type specimen in the Paris Herbarium, labeled in Bonpland's script, "prope urbem Ibarra."

ECUADOR: Quito, *Holway* 907; *Rose* 24066. Riobamba, *Mille* 254. Cotopaxi, *Sodiro* in 1890. Ambato, *Hitchcock* 21709, 21716, 21719, 21745. Baños, *Hitchcock* 21913. Malchinguí to Pomasqui, *Hitchcock* 20898.

79. **Stipa sellowiana** Nees.

Stipa sellowiana Nees; Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. **5**[1]: 38. 1842. "Brasilia merid. (Sellow!)." The type, in the Trinius Herbarium, has been examined. A specimen in the Berlin Herbarium is the same and bears the name in Nees' handwriting.

This species has the habit of *S. neesiana*, but the fruit is villous all over and the callus is shorter. There is no cylindric neck.

BRAZIL: Paraná, *Dusén* 1136a, 13369. Jordão, *Holway* 1803.

80. **Stipa arcuata** Fries.

Stipa arcuata R. E. Fries, Nov. Act. Soc. Sci. Upsal. IV. 1: 172. 1905. "Prov. Jujuy: Moreno * * * Fr. 944." A specimen of the type collection is in the U. S. National Herbarium.

ARGENTINA: Jujuy, *Fries* 944.

81. **Stipa paniculata** Hitchc., sp. nov.

Culms erect, stout, glabrous, puberulent below the nodes, 1 to 1.5 meters tall; sheaths glabrous, slightly hispidulous at the throat; ligule truncate, about 1 mm. long; blades flat, glabrous beneath, scaberulous on upper surface, as much as 50 cm. long and 6 mm. wide, tapering to a slender point; panicle large and open, as much as 50 cm. long, the branches in rather distant fascicles, spreading, naked below, spikelet-bearing toward the extremity, as much as 15 cm. long, glabrous below, scaberulous toward the end, the axis glabrous, the lower node pubescent; spikelets pale, appressed along the branches, the pedicels scabrous-pubescent; glumes subequal, narrow, thin, acuminate, 3-nerved, 11 to 12 mm. long; lemma 8 to 9 mm. long, the callus sharp, pilose, 1 mm. long, the body pale, nearly terete, villous all over but sparsely so toward the somewhat narrowed hispid-ciliate summit; awn twice-geniculate, slightly twisted below, scaberulous, about 4 cm. long.

Type in the U. S. National Herbarium, no. 921,934, collected at El Candado, Province of Catamarca, Argentina, by P. Jörgensen (no. 1393). The type is the only specimen seen.

82. Stipa inconspicua Presl.

Stipa inconspicua Presl, Rel. Haenk. **1**: 227. 1830. "Hab. in Peruvia?" The type, in the German University at Prague, bears no data to indicate its origin.

Nassella caespitosa Griseb. Abh. Ges. Wiss. Göttingen **19**: 258. 1874. "Tucuman, in pascuis alpinis S. de Aconquija, supra Cienega." The type, in the Grisebach Herbarium at Göttingen, is *Lorentz & Hieronymus* 78.

Stipa caespitosa Speg. Anal. Mus. Nac. Montevideo **4**: 117. *f. 31.* 1901. Based on *Nassella caespitosa* Griseb.

Stipa sodiroana Hack. Oesterr. Bot. Zeitschr. **52**: 10. 1902. "Quito, in muris vetustis, rara; leg. Sodiro."

Nassella flaccidula Hack. in Repert. Nov. Sp. Fedde **6**: 154. 1908. "Bolivia: La Paz, Bergabhänge, 3700 m, 18. I. 1907, leg. Dr. O. Buchtien (no. 157 ex p.)." The type has been examined.

ECUADOR: Riobamba, *Mille* 258. Between La Toma and Loja, *Hitchcock* 21381. Between Loja and San Lucas, *Hitchcock* 21455. Between Oña and Cuenca, *Hitchcock* 21605.

PERU: Obrajillo, *Wilkes Expl. Exped.* Baños, *Wilkes Expl. Exped.* Río Blanco, *Macbride & Featherstone* 648. La Quinhua, *Hitchcock* 22258; *Macbride & Featherstone* 2033. Gollarisquisca, *Hitchcock* 22292, 22295, 22311. Cuzco, *Hitchcock* 22452, 22514. Juliaca, Dept. Puno, alt. 4000 meters, *Harlan* in 1914.

BOLIVIA: Lake Titicaca, *Buchtien* 2550; *Asplund* 6555, 6558. La Paz, *Buchtien* 855; *Holway* 461, 600. Pongo, *Hitchcock* 22771. Sorata, *Holway* 508. Unduavi, *Buchtien* 4257. Pasña, *Buchtien* 1188, 1189. Cochabamba, *Holway* 398; *Hitchcock* 22800, 22833, 22854. Atocha, *Hitchcock* 22880. Oro Ingenio, *Hitchcock* 22926. Ingenio de Oro, *Rusby* 247. Oruro, *Rose* 18925. Chiguana, *Asplund* 6553.

ARGENTINA: Without locality, *Lorentz & Hieronymus* 74.

83. Stipa airoides Ekman.

Stipa airoides Ekman, Ark. för Bot. **11**[4]: 31. *pl. 4. f. 2.* 1912. Collected by Ekman in Misiones, Argentina, "prope 'La Granja' praedium, * * n. 688." A specimen of the type collection is in the U. S. National Herbarium.

ARGENTINA: Posadas, *Ekman* 688.

84. Stipa illimanica Hack.

Stipa illimanica Hack. Repert. Nov. Sp. Fedde **11**: 22. 1912. "Bolivia: In declivibus montis Illimani prope Cotaño, 2450 m * * * Buchtien (no 3134)." The type has been examined in the Hackel Herbarium.

BOLIVIA: Cotaña, *Buchtien* 3134.

85. Stipa holwayi Hitchc., sp. nov.

Culms erect, glabrous, about 4-noded, 60 to 80 cm. tall; sheaths glabrous, sparsely villous at the throat; ligule acute, 1 to 2 mm. long on the culm-leaves, shorter on the innovations; blades flat or loosely involute, glabrous beneath, scabrous-puberulent on the upper surface, 20 to 40 cm. long, 1 to 3 mm. wide; panicle rather open, 10 to 20 cm. long, the axis glabrous, with long internodes between the clusters of slender spreading scabrous branches; spikelets pale, crowded toward the upper part of the branches; glumes somewhat unequal, narrow, acuminate, thin, glabrous, obscurely 3-nerved, about 1 cm. long; lemma 5 to 6 mm. long, the callus sharp, slender, over 1 mm. long, appressed-pubescent, the body finally dark gray, narrow, somewhat fusiform, appressed-villous all over, the upper hairs as much as 1.5 mm. long, the summit obscurely crowned; awn 3.5 to 4.5 cm. long, rather easily deciduous, twice-geniculate, twisted and scabrous-pubescent below, the first and second segments each about 8 mm. long, the third segment, 2 to 3 cm., very slender, somewhat flexuous.

Type in the U. S. National Herbarium, no. 1,108,419, collected at Cochabamba, Bolivia, March 8, 1920, by E. W. D. and Mary M. Holway (no. 380).

The only other specimen seen was collected at Challapata, Bolivia, altitude 3,900 meters, March 31, 1921, by Dr. E. Asplund (no. 6546).

86. **Stipa disticha** Hitchc., sp. nov.

Culms erect or nearly so, stout, rigid, woody, glabrous, 20 to 40 cm. tall, bearing stiffly appressed branches from the middle and upper nodes, the lower part clothed with overlapping sheaths, the blades having fallen, the upper bearing closely distichous leaves; sheaths closely overlapping, glabrous, striate, with a few stiff deciduous hairs at throat; ligule a short truncate membrane about 0.5 mm. long; blades flat or loosely involute, ascending, stiff, glabrous beneath, puberulent and sulcate on the upper surface, sharp-pointed, mostly 2 to 6 cm. long, 1 to 3 mm. wide; panicle narrow, compact, about 10 cm. long, the branches appressed, the axis, branches, and pedicels scabrous; glumes subequal, narrow, pale and hyaline, acuminate or awn-pointed, 3-nerved, scaberulous, 7 to 8 mm. long, lemma 4 mm. long, the callus 0.5 mm. long, the body villous all over, grayish, narrowed toward the summit; awn loosely twisted and scaberulous below, 1.5 to 2 cm. long, the first bend sometimes obscure.

Type in the U. S. National Herbarium, no. 1,060,373, collected in the closed zone on San Gallan Island, Peru, altitude about 350 meters, November 27, 1919, by Robert Cushman Murphy (no. 3478). The type is the only specimen seen.

87. **Stipa brachychaeta** Godr.

Stipa brachychaeta Godr. Mem. Acad. Montpellier **1**: 450. 1853. "Patria ignota." The article is on the "Florula Juvenalis seu Enumeratio et Descriptio Plantarum è seminibus exoticis inter lanas allatis enatarum in campestribus Portus Juvenalis, propè Monspelium." I have not seen the type, but the description applies to the Argentine specimens which Professor Hackel has referred to that species. It differs from *S. clandestina* in having involute blades and somewhat smaller fruit and smaller awns.

Stipa bertrandi Phil. Linnaea **33**: 283. 1864. "Ornat. Bertrand, horticultor intelligentissimus, hanc Stipam in radice Andium prope Santiago lectam pro pabulo colit." The type has been examined in the Philippi Herbarium. This and the Chilean specimens cited below under the distribution are taller and stouter, with somewhat more compact panicle, somewhat larger spikelets and less villous fruit. They may represent a distinct species.

Stipa lorentziana Griseb. Abh. Ges. Wiss. Göttingen (Symb. Fl. Arg.) **24**: 298. 1879. "C [Province Córdoba]: pr. Cordoba." The type, in the Grisebach Herbarium at Göttingen, has been examined.

Stipa amphicarpa Phil. Anal. Univ. Chile **93**: 726. 1896. "In Araucania prope Angol [Chile]." The type was examined in the Philippi Herbarium.

ARGENTINA: Colonia Ruiz Videla, Río Segundo, *Kneucker Gram. Exs.* 371; *Stuckert* 62. Estancia San Teodoro, Córdoba, *Kneucker Gram. Exs.* 371a. Capilla del Monte, Córdoba, *Stuckert* 18992. Buenos Aires, *Lillo* 8014. Córdoba, *Stuckert* 10171, 11710, 13655. La Plata, *Parodi* 58. El Caudada, *Jörgensen* 1391.

CHILE: Santiago, *Philippi; Claude Joseph* 1100, 2342. San Antonio, *Claude Joseph* 1770.

88. **Stipa calamagrostis** (L.) Wahl.

Agrostis calamagrostis L. Syst. Nat. ed. 10. **2**: 872. 1759. Described from Europe.

Stipa calamagrostis Wahl. Veg. Helv. Sept. 23. 1813. Based on *Agrostis calamagrostis* L.

Stipa (*Lasiagrostis*) *longifolia* Phil. Anal. Univ. Chile **93**: 725. 1896. "Exstat in herbario specimen a Cl. Gay prope Quillota [Chile], 1831, lectum sub nr. 173." The only specimen in the Philippi collection under this name is from Quillota, but the collector and date are not given. It probably is the type.

This species is probably introduced.

89. Stipa pittieri Hitchc., sp. nov.

Culms somewhat geniculate at the rather slender base, loosely cespitose or single, glabrous, about 4-noded, 60 to 100 cm. tall; sheaths glabrous, pubescent at the throat, and hispidulous on the collar; ligule truncate, as much as 1 mm. long on the uppermost leaf, very short on the lower; blades flat, rather lax, sparsely hispidulous on both surfaces, 15 to 25 cm. long, 2 to 3 mm. wide; panicle narrow, loose, 15 to 25 cm. long, the axis scaberulous, the branches slender, scabrous, ascending or spreading, as much as 10 cm. long, fascicled, the longer ones naked below; glumes subequal, narrow, pale, rather thin, acuminate, 3-nerved, about 7 mm. long; lemma about 6 mm. long, the callus sharp, villous, pubescent, 1 mm. long, the body pale, somewhat fusiform, rather sparsely villous all over with short hairs, the obscure crown ciliate; awn twice-geniculate, loosely twisted below, scabrous, about 2 cm. long.

Type in the U. S. National Herbarium, no. 531,634, collected below Pitaió, Río Palo Basin, Tierra Adentro, State of Cauca, Colombia, altitude 2,400 meters, February, 1906, by H. Pittier (no. 1438).

The only other specimen seen was collected at Las Escaleretas, Moras Valley, Río Paez Basin, Tierra Adentro, altitude 2,500 to 3,000 meters, *Pittier* 1334.

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THE GRASSES OF ECUADOR, PERU, AND BOLIVIA

By A. S. HITCHCOCK

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11

PREFACE

The accompanying paper by Prof. A. S. Hitchcock, botanist in charge of systematic agrostology, United States Department of Agriculture, is an account of the grasses of the central Andes, including the three countries, Ecuador, Peru, and Bolivia. Most of the region is mountainous, the Andes traversing it from north to south. Though lying under the Equator, much of the region is at so high an elevation that many ranges and peaks are capped with perpetual snow. The flora is mainly temperate and alpine, but it becomes tropical on the coastal plain and on the eastern slope, where the mountains merge into the Amazon Basin. There are wide differences in the amount of rainfall. The base of the eastern slope lies in the humid tropical forest, while the coastal region of Peru is one of the driest regions of the world. Because of the extremes of altitude and precipitation the grass flora is large and varied. The present paper includes 124 genera and 605 species, of which 29 species are new.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

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THE GRASSES OF ECUADOR, PERU, AND BOLIVIA

By A. S. Hitchcock

INTRODUCTION

In 1923 the author visited Ecuador, Peru, and Bolivia for the purpose of studying the grasses of the central Andes. The identification of the specimens collected was difficult, because the descriptions of the species are widely scattered in journals and isolated articles and because the grasses of the region have never been studied and coordinated as a whole. There is no flora of the region nor of any one of the countries, nor are there revisions of any of the larger genera of grasses of the Andes. Having brought together much of the scattered information while identifying the grasses collected during the exploration mentioned above, it seemed desirable to continue the work and prepare an account of all the grasses known from the three countries mentioned.

ITINERARY [1]

The expedition to Ecuador was made in cooperation with the Gray Herbarium of Harvard University and with the New York Botanical Garden. Collections were made on the coastal plain at Guayaquil and at the Oil Camp between Guayaquil and Salinas and at Milagro, Teresita, and Panigón Plantation. Later, with Huigra as a center, several localities between Naranjapata and Alausí were visited. From Quito an overland trip was made to Tulcán, stopping at La Rinconada, a ranch in the Province of Carchi. A trip was made also to Pichincha, a mountain near Quito. A second overland trip was made in the southern part of the country from Santa Rosa, on the coast, through Portovelo, El Tambo, and La Toma to Loja, then north through Oña and Cuenca to Huigra. A third trip was made from Ambato to Baños and a day's journey eastward to Cashurco, a short distance west of Mera. The last trip was the ascent of Mount Chimborazo to snow line (about 5,000 meters), starting from Urbina on the railroad.

[1] See also Scientific Monthly **19**: 611–624. 1924; **20**: 47–63. 1925; **20**: 163–175. 1925. Explorations and Field Work in 1924, Smiths. Misc. Coll. **77**[2]: 57–67. 1925, Ann. Rep. Smiths. Inst. **1924**: 335–351. 1925.

The itinerary in Peru included visits to the central and southern parts of the country. Landing at Callao, a journey was made inland over the marvelous mountain railroad to Oroya and Cerro de Pasco. Then followed a side trip to Tarma, La Merced, and Colonia Perené, a large coffee plantation on the Perené River, to the east, and to Atocsaico Ranch near Junín. From Cerro de Pasco there were excursions to La Quinhua and to Goyllarisquisca. Cuzco was reached by railroad from Mollendo. Collections were made at Mollendo, Arequipa, the experiment station at Chuquibambilla and Cuzco, and in the Urubamba Valley to the north at Ollantaytambo.

Four sections in Bolivia were visited. The first trip was from La Paz to Illimani, one of the highest peaks in Bolivia. The mountain lies about 30 miles east of the city and rises to the height of 6,619 meters (21,700 feet). The ascent was made to one of the large glaciers (about 5,000 meters). The second trip was to the Yungas in company with Dr. Otto Buchtien, the well-known German botanist, long resident in Bolivia. Collections were made at Pongo, at that time the terminus of the railroad from La Paz, and at various points in the Provinces of Sur-Yungas and Nor-Yungas. The journey led through San Felipe, La Florida, Chulimani, Coripata, Coroico, Bella Vista and back to Pongo. The third trip was to Cochabamba; the fourth from Atocha to La Quiaca in northern Argentina. Atocha was the terminus of the railroad under construction to connect the Bolivian system with the terminus of the Argentine system at La Quiaca.

GRASS MATERIAL AVAILABLE FOR STUDY

The United States National Herbarium is unusually rich in Andean grasses. Aside from the grasses collected during the expedition outlined above, there is the original Buchtien Herbarium recently acquired by the National Museum. This contains the best collections of grasses ever made in Bolivia. In addition to the specimens collected by Buchtien, there are many collected by Asplund and a few by Pflanz. Other notable collections are those of Francis Macbride and his assistants in central Peru, made under the auspices of the Field Museum, Chicago; the sets distributed by Dr. H. H. Rusby, including the collections of Miguel Bang and those of the Mulford biological exploration, made chiefly by Rusby, White, and Cárdenas; a series of grasses from several South American countries, including Ecuador, Peru, and Bolivia, collected by E. W. D. and Mary M. Holway, chiefly to aid in identifying the hosts of fungi obtained at the same time. The large and important sets mentioned above are complete or nearly so. Among the smaller sets are those made in Ecuador and Peru by Dr. J. N. Rose, in the vicinity of Quito by Brother Harteman, in central western Peru by the Wilkes exploring expedition, in the Urubamba Valley, Peru,

by Cook and Gilbert, and in the vicinity of Juliaca, Peru, by Dr. H. V. Harlan, of the United States Department of Agriculture.

While in Quito the author had the privilege of consulting the herbarium assembled by Prof. Luis Sodiro, the well-known Ecuadorean botanist. The herbarium is at the Colegio de San Gabriel. At the time of the author's visit Father Luis Mille was in charge of the collection. Father Mille has collected extensively in Ecuador himself. He courteously permitted the author to select a series of duplicates from the Sodiro Herbarium and from his own collections.

The National Herbarium contains less complete sets of the grasses collected in Ecuador by Jameson, Spruce, Eggers, Lehmann, Anthony and Tate, and Stübel; in Peru by Lechler; and in Bolivia by Mandon, Herzog, Steinbach, and Fiebrig.

The herbarium of Prof. E. Hackel, the eminent Austrian agrostologist, was acquired a few years ago by the Natural History Museum of Vienna. This contains the types of the large number of species described by Professor Hackel from all parts of the world. In 1922 Agnes Chase, associate in systematic agrostology, visited Vienna for the purpose of studying this collection. With the permission of the director of the department of botany, Dr. A. Zahlbruckner, Mrs. Chase obtained a series of duplicates and fragments of the type specimens. Among these were many having a special bearing on the present work, especially the types of species described from the collections of Sodiro in Ecuador and of Buchtien in Bolivia.

Dr. R. Pilger, of the Berlin Herbarium, has very courteously contributed to the National Herbarium portions of the type specimens of nearly all the species he has described, based on the collections of Weberbauer in Peru.

The directors of several European herbaria have contributed fragments of type specimens. The most important collection from Ecuador of which no duplicates are in the United States National Herbarium is that made by Humboldt and Bonpland in their famous journey of exploration through northern South America. Many of the types of new species based upon this collection have been examined in Paris by the writer and by Mrs. Chase, and Dr. H. Lecomte, director of the department of botany of the Museum of Natural History, has cooperated by examining others.

The director of the Royal Botanic Gardens at Kew, England, Dr. Arthur W. Hill, kindly lent for study a large series of mounted specimens of grasses from Ecuador, Peru, and Bolivia, contained in the Kew Herbarium. This series contained the collections of Jameson, Spruce, and André from Eucador, and of Ball and Mathews from Peru. There was also a good representation of the collec-

tions of Lechler from Peru and of Mandon from the vicinity of Sorata, Bolivia.

Prof. Carl Mez, of Königsberg, has described many grasses from various parts of the world, including Ecuador, Peru, and Bolivia. In his studies he has used many European herbaria, but unfortunately he has not stated in what herbaria his cited specimens are to be found. Many of his types have been located but several are still unplaced. Some of his species can not be identified from the descriptions alone.

The most important early collection of plants made in Peru was that of Haenke, the grasses of which were described by Presl.[2] The author examined the types of the grasses of this collection in 1907. These types were in part at the herbarium of the National Musuem at Prague and in part at the herbarium of the German University in the same city.

Altogether the material at hand for a study of the grasses of the central Andes is fairly abundant and representative as compared with that from other parts of South America.

SCOPE OF THE WORK

As stated above, information has been collated from many sources, but the list of grasses is based primarily upon the specimens in the United States National Herbarium. A few specimens from other herbaria have been examined, but in all cases where the specimen is not in the National Herbarium its location is indicated.

An attempt has been made to account for all the species described from Ecuador, Peru, and Bolivia. The synonymy includes all such species and in addition the more important synonyms as given in the works bearing upon the botany of the Andes.

The geographical limits of the three Andean countries are accepted as commonly given on our standard maps, such as those of the Century Atlas, in which Tacna is included in Chile. There are many disputed boundary lines, and much territory is claimed by more than one country. The disputed areas have not been given consideration because the specimens cited were not collected in these parts.

The range of each species is given, but the detailed citation of specimens is limited to Ecuador, Peru, and Bolivia.

It has been found advisable to exclude from consideration the Galápagos Islands, a dependency of Ecuador. The flora is largely endemic and not closely related to the flora of Ecuador; moreover, it has been rather intensively studied and recorded in several publications.[3]

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[2] Reliquiae Haenkeanae. 1830.

[3] Alban Stewart. A Botanical Survey of the Galápagos Islands, Proc. Calif. Acad. ser. 4. 1: 7–288. 1911. This includes a bibliography.

In order to aid in identification the keys have been supplemented by brief descriptions of the species.

To conserve space, the localities in most cases have been cited by name only, without giving the province or department. The larger places are given on standard maps. The smaller places are to be found only on large or specialized maps, and some localities found on the labels of plants have not yet been identified. The localities cited have been brought together for ready reference and will be found at the end of the list of species (p. 511).

For species described originally from Ecuador, Peru, or Bolivia the type is indicated in the paragraph on range. The type specimens of the synonyms are given after the formal bibliographic citation if the type is from one of the countries mentioned. If the type is from some other country no specimen is given.

BOTANICAL EXPLORATION IN THE CENTRAL ANDES

The first important botanical exploration of Ecuador was made by Humboldt during his famous journey through Venezuela, Colombia, Ecuador, and Northern Peru. The botanical collections were made chiefly by Bonpland, and the plants were described by Kunth.[4] From Colombia Humboldt's party passed through the central valley of Ecuador and into Peru as far south as Cajamarca.[5]

Jameson, a professor in the University of Quito, collected for many years and sent his plants to Kew. He published a flora[6] of the region, but the work does not contain the grasses.

The next collection of importance was made by Spruce. After having spent several years in the Amazon Valley, he ascended into Ecuador from the east, by way of the Pastaza Valley. He collected mostly in the vicinity of Baños, Ambato, Riobamba, Quito, and Chanduy. He also visited northern Peru, making his headquarters at Tarapoto. His collections are at Kew. Wallace published his life and letters.[7]

The botanical exploration in Peru is very fully outlined by Weberbauer in his account of the vegetation of the Peruvian Andes[8] and

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[4] Voyage de Humboldt et Bonpland. Sixième Partie. Botanique. Nova Genera et Species Plantarum. Kunth.

[5] The itinerary of the party in Ecuador and Peru has been worked out at Kew. See Kew Bull. Misc. Inf. 1926: 181. 1926.

[6] William Jameson. Synopsis Plantarum Quitensium. 1865.

[7] A. R. Wallace. Notes of a Botanist on the Amazon and Andes, by Richard Spruce. 2 volumes, 1908.

[8] Die Pflanzenwelt der peruanischen Anden (Die Vegetation der Erde, vol. 12). A. Weberbauer, 1911. A history of botanical collecting in Peru is given.

in Bolivia by Herzog in his account of the vegetation of the Bolivian Andes.[9]

PHYSIOGRAPHIC AREAS

The distribution of the vegetation as modified by altitude and rainfall has been discussed by Weberbauer for Peru and by Herzog for Bolivia, in their accounts of the vegetation of the Peruvian and Bolivian Andes referred to above. A corresponding account for Ecuador has not been published. A good account of the physiographic features of that country has been given by Wolf,[10] but this author gave no special attention to the vegetation.

In the area under consideration there are three primary divisions. Along the Pacific there is a coastal plain, from 25 to 100 miles wide, rising gradually to the foot of the Andes or Cordillera. In northern Ecuador the rainfall is heavy and the climate humid. The rainfall decreases rapidly southward and the coastal region of Peru is a desert. The valleys of the numerous rivers flowing from the mountains to the sea are utilized for agricultural purposes, the crops thriving under irrigation.

Approximately parallel to the coast runs the mighty mountain backbone of the continent, the Andes or Cordillera. The western slope is for the most part steep, and there is only a very narrow region of foothills. In Ecuador there are two main ranges of the Cordillera with a high valley between, this broken by several cross ranges. The interior valley is from 2,000 to 3,000 meters altitude. There are numerous high peaks, Chimborazo (6,310 meters) and Cotopaxi (5,943 meters) being the best known.

In Peru the western range continues southward to the southern border and then forms the boundary line between Bolivia and Chile. The eastern range is less marked and has numerous branches. In a general way it continues parallel to the western range through Peru to the east of Lake Titicaca, then turns eastward and southward, gradually merging into the general slope in Argentina. Thus there is a series of high valleys in Peru, in the southern part becoming plateaus 3,500 to 4,000 meters in altitude. In Bolivia the ranges spread so as to form a great central plateau 400 miles long and 200 to 300 miles wide, broken by many spurs, branches, and peaks. The altitude here is 3,600 to 4,200 meters (12,000 to 14,000 feet).

The eastern slope of the Cordillera merges into the valleys of the Amazon and Paraguay Rivers. In Ecuador and Peru the slope is

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[9] Die Pflanzenwelt der bolivischen Anden (Die Vegetation der Erde, vol. 15), Th. Herzog, 1923. A history of botanical exploration in Bolivia is given.

[10] Geografía y Geología del Ecuador. Teodoro Wolf, 1892. See also Naturalists' Guide to the Americas, 666 (1926), a short account of Ecuador by Wilson Popenoe.

precipitous and heavily forested and has a high rainfall. In Bolivia south of the Beni region the slope is more gradual and has a meager rainfall. The forest changes to scrub and finally gives way to grassy plains.

The high valleys and plateaus are for the most part treeless. Except in protected places crops are not grown above about 3,500 meters. In Ecuador and Peru the uplands have sufficient rainfall for stock raising. In Bolivia much of the plateau is arid and in the southern part is a desert. Vegetation in the mountains extends to snow line, which is at about 5,000 meters.

ECONOMIC GRASSES

Only three grasses are cultivated for forage in the lowlands. Para grass (*Panicum barbinode*) and Guinea grass (*Panicum maximum*) are widely grown in tropical regions. A native grass (*Axonopus scoparius*) has been brought into cultivation, and gives promise of much value. It is called "gamalote" in Ecuador, "maicillo" in Peru, and "cachi" in the Yungas region of Bolivia.

In the temperate regions of the Cordillera are often grown the European forage grasses, such as ryegrass (*Lolium multiflorum*) and bluegrass (*Poa pratensis*). Maize (*Zea mays*) is commonly used for forage. The chief forage plant of these regions, however, is alfalfa (*Medicago sativa*).

In the uplands of Peru the native grasses produce abundant forage, which is increasingly utilized for sheep and cattle. Over large areas the dominant grass is ichu grass (*Stipa ichu*), a bunch grass with stiff involute leaves. This is grazed by stock only when the leaves are young. Sheep confine themselves mostly to the small species, such as *Muhlenbergia ligularis*, that grow between the bunches of ichu. The forage at high altitude is derived from a great number of native species belonging chiefly to *Festuca*, *Calamagrostis*, and *Poa*.

DESCRIPTIVE LIST, WITH KEYS

KEY TO THE TRIBES

Series 1. POATAE

Spikelets 1 to many-flowered, the reduced florets, if any, above the perfect florets (except in Phalarideae; 1 or more sterile lemmas below in Bambuseae and in *Uniola*); articulation usually above the glumes.

Plants woody (scarcely so in *Neurolepis*), low or tall shrubs, often clambering, rarely tall trees. Spikelets 1 to many-flowered, 1 to several sterile lemmas below the perfect ones----------**BAMBUSEAE** (p. 299).

Plants herbaceous (somewhat woody in *Arundo*).
Stigmas 3. Stamens 6; spikelets 1-flowered; lemma with a long, much-contorted awn----------6. STREPTOCHAETA[10a] (p. 313).
Stigmas 2.
Spikelets with 2 staminate, neuter, or rudimentary lemmas unlike and below the fertile lemma; no sterile or rudimentary florets above.
PHALARIDEAE (p. 303).
Spikelets without sterile lemmas below the perfect floret or these rarely present and like the fertile ones.
Spikelets unisexual, 1-flowered; plants monoecious.
Lemma terete; fruit adhesive by hooked hairs; blades elliptic, broad.
81. PHARUS[10a] (p. 420).
Lemma globular, smooth; blades linear, narrow--ZIZANIEAE (p. 304).
Spikelets perfect (rarely unisexual but then not as above), usually articulate above the glumes.
Spikelets articulate below the glumes, 1-flowered, very flat, the lemma and palea about equal, both keeled; glumes small or wanting.
ORYZEAE (p. 303).
Spikelets articulate above the glumes (rarely below, but the glumes, at least one, well developed).
Spikelets 1-flowered in groups (short spikes) of 2 to 5, the groups racemose along a main axis, falling entire; lemma and palea thinner than the glumes----------NAZIEAE (p. 303).
Spikelets not as above.
Spikelets sessile on a usually continuous rachis (short-pedicellate in *Leptochloa;* the rachis disarticulating in *Hordeum*).
Spikelets on opposite sides of the rachis; spike terminal, single.
HORDEAE (p. 301).
Spikelets on one side of the rachis; spikes usually more than 1, digitate or racemose----------CHLORIDEAE (p. 303).
Spikelets pedicellate in open or contracted, sometimes spikelike, panicles.
Spikelets 1-flowered----------AGROSTIDEAE (p. 302).
Spikelets 2 to many-flowered.
Glumes as long as the lowest floret, usually as long as the spikelet; lemmas awned from the back (spikelets awnless in *Dissanthelium,* awn from between lobes in *Danthonia.*
AVENEAE (p. 301).
Glumes shorter than the lowest floret; lemmas awnless or awned from the tip or from a bifid apex.
FESTUCEAE (p. 299).

Series 2. PANICATAE

Spikelets with 1 perfect terminal floret (disregarding the few monoecious genera and the staminate and neuter spikelets) and a sterile or staminate floret below, usually represented by a sterile lemma only, 1 glume sometimes (rarely both glumes) wanting; articulation below the spikelets (except in Melinideae), either in the pedicel, in the rachis, or at the base of a cluster of spikelets, the spikelets falling entire, either singly, in groups, or together

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[10a] *Streptochaeta* and *Pharus* are anomalous genera that are not here assigned to tribes.

with joints of the rachis; spikelets, or at least the fruits, more or less dorsally compressed. (*Panicum quadriglume* has 2 sterile lemmas; *Isachne* has 2 perfect florets.)

Glumes membranaceous; fertile lemma and palea indurate or at least as firm as the glumes; sterile lemma like the glumes in texture.

Fertile lemma and palea scarcely firmer than the glumes; lower floret staminate or neuter, awnless, the perfect floret awned (except in *Melinis*).
MELINIDEAE (p. 304).

Fertile lemma and palea indurate or subindurate, usually much firmer than the glumes; perfect floret usually awnless_____**PANICEAE** (p. 304).

Glumes indurate; fertile lemma and palea hyaline or membranaceous, the sterile lemma like the fertile one in texture.

Inflorescence not monoecious, the fertile spikelets perfect, each usually paired with a sterile spikelet_____**ANDROPOGONEAE** (p. 305).

Inflorescence monoecious, the pistillate spikelets below, the staminate above on the same rachis_____**TRIPSACEAE** (p. 306).

KEY TO THE GENERA

1. BAMBUSEAE

Stamens 6. Spikelets several-flowered_____**1. GUADUA** (p. 306).

Stamens 3.

Spikelets few to several-flowered_____**2. ARUNDINARIA** (p. 307).

Spikelets 1-flowered.

Spikelets in a 1-sided spike_____**4. MEROSTACHYS** (p. 312).

Spikelets in open or spikelike panicles.

Culms woody; blades jointed at base, mostly not more than 20 cm. long and 2 cm. wide, commonly much smaller___**3. CHUSQUEA** (p. 308).

Culms scarcely woody; blades continuous with the sheath, 30 to 100 cm. long and more than 2 cm. wide_____**5. NEUROLEPIS** (p. 312).

2. FESTUCEAE

Lemmas divided at summit into 9 or more awns or awnlike lobes.

Awns unmixed with awned teeth; all florets falling attached, their awns forming a pappuslike crown, only the lowest floret fertile; panicles narrow_____**28. PAPPOPHORUM** (p. 351).

Awns mixed with awned teeth; florets not falling attached, the rachilla disarticulating between them; panicles somewhat open.
27. COTTEA (p. 351).

Lemmas not divided into several lobes, awnless, with a single awn, or, if 3, the lateral awns minute.

Tall stout reeds (or stout bunch grasses in *Cortaderia; C. sericantha* dwarf) with large plumelike panicles; lemmas or rachilla with long silky hairs as long as the lemmas (staminate spikelets glabrous in *Gynerium*).

Blades crowded at the base of the culms_____**19. CORTADERIA** (p. 346).

Blades distributed along the culms.

Spikelets unisexual; plants dioecious; culms very tall, short-jointed, the sheaths conspicuously imbricate (the blades commonly fallen from the lower sheaths); staminate spikelets glabrous, the panicle very different in appearance from that of the pistillate spikelets.
20. GYNERIUM (p. 348).

Spikelets perfect; plants moderately tall.

Lemmas hairy; rachilla naked_____**17. ARUNDO** (p. 345).

Lemmas naked; rachilla hairy_____**18. PHRAGMITES** (p. 346).

Low or rather tall grasses, if more than 1 meter not stout bunch grasses.
Plants dioecious, perennial from creeping rhizomes. Lemmas glabrous; grasses of salt or alkaline soils---------- **15. DISTICHLIS** (p. 344).
Plants not dioecious (except in species of *Poa*) not as above.
Blades broad, ovate to elliptic, showing transverse veins between the nerves.
Spikelets 3 to 5-flowered; glumes broad, truncate; panicles small. **25. ZEUGITES** (p. 350).
Spikelets 1 or 2-flowered, the second floret commonly obsolete, only the elongate rachilla present; glumes acuminate; panicle large, diffuse. **24. ORTHOCLADA** (p. 350).
Blades linear, no transverse veins showing.
Spikelets in 1-sided dense clusters, these at the ends of a few stiff panicle branches---------- **21. DACTYLIS** (p. 349).
Spikelets not in 1-sided clusters.
Lemmas 3-nerved, the nerves prominent, often hairy.
Inflorescence a few-flowered head or capitate panicle overtopped by the leaves or partly concealed in them. Lemmas toothed or cleft; low plants of the arid regions (Chlorideae). **74. MUNROA** (p. 418).
Inflorescence an exserted open or spikelike panicle.
Lemmas glabrous.
Glumes longer than the lemmas (Aveneae). **34. DISSANTHELIUM** (p. 356).
Glumes shorter than the lemmas-- **14. ERAGROSTIS** (p. 335).
Lemmas pubescent on the nerves.
Panicle condensed, few-flowered------ **26. TRIODIA** (p. 351).
Panicle open, many-flowered (Chlorideae). **64. GOUINIA** (p. 410).
Lemmas 5 to many-nerved, the nerves sometimes obscure.
Spikelets with 1 to 4 empty lemmas below the fertile florets; nerves obscure; lemmas firm---------- **16. UNIOLA** (p. 345).
Spikelets with no empty lemmas below the fertile florets; nerves usually prominent; lemmas membranaceous (firm in a few species of *Bromus* and *Festuca*).
Lemmas flabellate; glumes wanting; inflorescence dense, cylindric. Low annual---------- **23. ANTHOCHLOA** (p. 350).
Lemmas not flabellate; glumes present; inflorescence not cylindric.
Internodes of rachilla elongate. Glumes minute. **10. APHANELYTRUM** (p. 325).
Internodes of rachilla not conspicuously elongate.
Glumes with conspicuous thin translucent margins; upper florets much reduced, forming a stalked rounded mass. **22. MELICA** (p. 349).
Glumes not conspicuously margined; upper florets sometimes reduced but not forming a stalked mass.
Lemmas as broad as long, the margins outspread; florets closely imbricate, horizontally spreading (less so in *B. mandoniana*) ---------- **13. BRIZA** (p. 334).
Lemmas longer than broad, the margins clasping the palea; florets not horizontally spreading.

Lemmas awnless, obtuse or acutish.
Lemmas more or less keeled on the back.
12. POA (p. 326).
Lemmas rounded on the back.
11. PUCCINELLIA (p. 325).
Lemmas awned or acuminate.
Spikelets terete, short-pediceled along the main axis, forming a simple raceme
8. BRACHYPODIUM (p. 318).
Spikelets laterally compressed in an open or condensed panicle.
Awn from between 2 short teeth (sometimes nearly wanting in *B. unioloides*) **7. BROMUS** (p. 314).
Awn terminal. (See also *Gouinia.*)
9. FESTUCA (p. 318).

3. HORDEAE

Spikelets solitary at each node of the rachis, several-flowered.
Spikelets placed edgewise to the rachis **32. LOLIUM** (p. 355).
Spikelets placed flatwise to the rachis **29. AGROPYRON** (p. 352).
Spikelets more than one at each node of the rachis.
Spikelets 2 at each node of the rachis. Glumes narrow, acuminate or awned.
30. ELYMUS (p. 353).
Spikelets 3 at each node of the rachis.
Glumes narrow, awned or awnlike **31. HORDEUM** (p. 353).
Glumes broad and rounded, awnless **33. PARIANA** (p. 356).

4. AVENEAE

Spikelets awnless. Glumes equal, longer than the florets; dwarf subalpine grasses with small few-flowered panicles **34. DISSANTHELIUM** (p. 356)
Spikelets awned.
Awn of the lemma from between the teeth of a bifid apex, flattened.
Plants robust, with large many-flowered plumelike panicles; awn spreading from near the scarcely twisted base, flexuous or loosely twisted above.
43. LAMPROTHYRSUS (p. 362).
Plants not robust; panicles not large and plumelike; awn twisted below the bend, nearly straight above **42. DANTHONIA** (p. 362).
Awn dorsal.
Spikelets 2-flowered, the lower floret perfect, awnless; upper floret staminate, bearing a hooklike dorsal awn **41. NOTHOLCUS** (p. 362).
Spikelets 2 to several-flowered, the florets all fertile.
Awn short, near the apex of the lemma **35. KOELERIA** (p. 357).
Awn inserted near the base or toward the middle of the lemma.
Plants perennial.
Lemmas keeled, the awn from above the middle.
36. TRISETUM (p. 358).
Lemmas rounded on the back, the awn from below the middle.
38. AIRA (p. 361).
Plants annual.
Awn club-shaped, with a circle of short stiff hairs at the point of articulation **40. WEINGAERTNERIA** (p. 362).

Awn without hairs, not club-shaped.
Inflorescence a small erect divergently branched panicle; spikelets 2 mm. long----------39. **ASPRIS** (p. 361).
Inflorescence a rather large drooping few-flowered panicle; spikelets 10 to 30 mm. long----------37. **AVENA** (p. 360).

5. AGROSTIDEAE

Rachilla articulate below the glumes, the spikelet deciduous.
Spikelets in pairs in a spikelike panicle, one perfect, the other staminate or neuter, the pair falling together----------49. **LYCURUS** (p. 385).
Spikelets all alike.
Glumes awned----------48. **POLYPOGON** (p. 384).
Glumes awnless.
Inflorescence a dense spikelike panicle----47. **ALOPECURUS** (p. 383).
Inflorescence an open panicle----------46. **CINNA** (p. 383).
Rachilla articulate above the glumes.
Fruit indurate, terete or short and globose or ovoid (then sometimes somewhat compressed).
Awn trifid (the lateral awns obsolete in *A. schiedeana*).
59. **ARISTIDA** (p. 403).
Awn simple.
Spikelets on short peduncles among the acicular leaves. Lemma extending into a hard awnlike point; plants mosslike, forming dense cushions----------53. **ACIACHNE** (p. 390).
Spikelets in exserted panicles.
Fruit terete, two to several times as long as wide; awn persistent or tardily deciduous----------58. **STIPA** (p. 396).
Fruit one to two times as long as wide; awn readily deciduous, more or less eccentrically attached.
Lemma entirely inclosing the palea.
Fruit oblong or elliptic, not gibbous----55. **ORYZOPSIS** (p. 394).
Fruit obovoid, gibbous at summit, somewhat flattened.
56. **NASSELLA** (p. 394).
Lemma not quite inclosing the lemma, leaving a sulcus on the palea side, fruit globose, somewhat flattened, strongly asymmetric at summit----------57. **PIPTOCHAETIUM** (p. 396).
Fruit thin or firm but scarcely indurate, if firm, the nerves evident; callus not well developed.
Perfect spikelet surrounded by several sterile spikelets in the form of bristles or delicate bracts----------50. **PEREILEMA** (p. 385).
Perfect spikelet not accompanied by sterile spikelets.
Rachilla prolonged behind the palea---41. **CALAMAGROSTIS** (p. 363).
Rachilla not prolonged (except in *Agrostis trichodes*).
Lemma shorter than the glumes, thin and delicate.
45. **AGROSTIS** (p. 378).
Lemma as long as or longer than the glumes, not more delicate than these.
Lemma awnless, obtuse or acutish; 1 glume, sometimes both glumes, shorter than the lemma----------54. **SPOROBOLUS** (p. 391).
Lemmas awned or acuminate, if only acute the acute glumes about equal.
Awn dorsal, geniculate, the lemma bifid at apex.
52. **TRINIOCHLOA** (p. 390).
Awn terminal, not geniculate----51. **MUHLENBERGIA** (p. 386).

6. NAZIEAE

Spikelets bearing hooked spines on the second glume, the group forming a little bur——60. **NAZIA** (p. 407).
Spikelets not bearing hooked spines.
Groups of spikelets in a close cylindric spike——61. **ANTHEPHORA** (p. 407).
Groups of spikelets nodding along 1 side of the delicate axis.
62. AEGOPOGON (p. 407).

7. CHLORIDEAE

Inflorescence a few-flowered head or capitate panicle hidden among the sharp-pointed leaves. A low spreading annual——74. **MUNROA** (p. 418).
Inflorescence exserted.
Spikes solitary or racemosely arranged.
Spike solitary (see also *Bouteloua simplex* with pectinate spikelets, the lemmas 3-awned).
Spikelets 1-flowered——69. **MICROCHLOA** (p. 412).
Spikelets several-flowered——65. **TRIPOGON** (p. 410).
Spikes several.
Spikelets with 1 perfect floret and a rudiment above; spikes short and thick——73. **BOUTELOUA** (p. 416).
Spikelets 1 to several-flowered; spikes long and slender.
Spikelets 1 or 2-flowered, the upper floret reduced or rudimentary.
70. GYMNOPOGON (p. 412).
Spikelets several-flowered.
Lemmas awnless or short-awned; upper floret reduced to an awnless small lemma——63. **LEPTOCHLOA** (p. 408).
Lemmas with awns as long as the body; upper floret reduced but awned——64. **GOUINIA** (p. 410).
Spikes more or less digitate.
Spikelet 1-flowered, the rachilla prolonged as an inconspicuous bristle.
68. CYNODON (p. 411).
Spikelets 1-flowered, with a rudimentary floret above, or 2 to several-flowered.
Lemmas 3-awned——72. **TRICHLORIS** (p. 415).
Lemmas 1-awned or awnless.
Spikelets with 1 perfect floret and 1 or more rudimentary florets.
71. CHLORIS (p. 413).
Spikelets 3 to several-flowered.
Rachis prolonged beyond the spikelets.
67. DACTYLOCTENIUM (p. 411).
Rachis not prolonged——66. **ELEUSINE** (p. 411).

8. PHALARIDEAE

Lower florets staminate; spikelets brown and shining——75. **TORRESIA** (p. 418).
Lower florets neuter; spikelets green or yellowish.
Lower florets reduced to small awnless scalelike lemmas; spikelet much compressed laterally; glumes equal——77. **PHALARIS** (p. 419).
Lower florets consisting of awned hairy sterile lemmas exceeding the fertile floret; spikelet terete; first glume much shorter than the second.
76. ANTHOXANTHUM (p. 419).

9. ORYZEAE

Glumes minute; lemma often awned——78. **ORYZA** (p. 419).
Glumes wanting; lemma awnless——79. **LEERSIA** (p. 420).

10. ZIZANIEAE

A single genus in our area----------80. **LUZIOLA** (p. 420).

11. MELINIDEAE [11]

Spikelets in clusters of 3; awns 4 to 6 cm. long---84. **TRISTACHYA** (p. 423).
Spikelets solitary on distinct pedicels.
Lower floret staminate----------83. **TRICHOPTERYX** (p. 422).
Lower floret neuter----------82. **ARUNDINELLA** (p. 422).

12. PANICEAE

Spikelets unisexual; plants monoecious.
Pistillate spikelets above, the staminate below on the branches of the same panicle. Blades broad, elliptic or lanceolate (smaller in *O. laterale*).
107. OLYRA (p. 489).
Pistillate and staminate spikelets in distinct small panicles.
108. RADDIA (p. 491).
Spikelets all of one kind.
Spikelets subtended or surrounded by 1 to many distinct or more or less connate bristles, forming an involucre.
Bristles persistent, the spikelets deciduous--**104. CHAETOCHLOA** (p. 476).
Bristles or spines falling with the spikelets at maturity.
Bristles not united, slender, sometimes plumose.
105. PENNISETUM (p. 481).
Bristles united into a burlike involucre (united at base only in *C. myosuroides*), the bristles retrorsely barbed (antrorsely barbed in *C. pilosus*)----------**106. CENCHRUS** (p. 487).
Spikelets not subtended by bristles.
Glumes or sterile lemma awned (awn reduced to a point in *Echinochloa colonum*). Spikelets racemose on the branches.
Blades lanceolate, broad and thin; glumes 2-lobed, awned from between the lobes----------**102. OPLISMENUS** (p. 474).
Blades long and narrow; glumes awned from the tip.
103. ECHINOCHLOA (p. 475).
Glumes and sterile lemma awnless (somewhat caudate in *Ichnanthus*).
Spikelets in open or condensed panicles.
Spikelets globose, oblique on the pedicels. Culms usually woody.
97. LASIACIS (p. 470).
Spikelets usually not globose, not obliquely set on the pedicels.
Spikelets with 2 perfect florets----------**101. ISACHNE** (p. 474).
Spikelets with 1 perfect floret.
Fertile lemma with wings or broad scars at base; glumes often somewhat caudate----------**96. ICHNANTHUS** (p. 468).
Fertile lemma not winged nor broadly scarred at base.
First glume wanting; spikelets silky-hairy.
85. LEPTOCORYPHIUM (p. 423).
First glume present.
Fruit indurate, its margin inrolled. First glume usually shorter than the spikelet--------**95. PANICUM** (p. 456).

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[11] In *Melinis* and its allies the sterile lemma is awned; in *Arundinella* and its allies the sterile lemma is awnless and the fertile lemma is usually awned. Until all the allied genera are studied *Arundinella* may be retained in Melinideae.

Fruit cartilaginous or membranaceous, the margin not inrolled.
First glume as long as the spikelet.
100. HOMOLEPIS (p. 473).
First glume shorter than the spikelet.
Second glume inflated-saccate; blades narrow, linear, not cordate-clasping——**98. SACCIOLEPIS** (p. 473.)
Second glume not inflated-saccate; blades broad, cordate-clasping——**99. HYMENACHNE** (p. 473).
Spikelets in 1-sided racemes, the racemes digitate or racemose. (See also *Ichnanthus minarum*.)
Rachilla joint and adnate rudimentary first glume forming a swollen ringlike callus at the base of the spikelet.
91. ERIOCHLOA (p. 428).
Rachilla joint not forming a ringlike callus.
Blades ovate-lanceolate; racemes loose; mature spikelets burlike with hooked hairs——**89. PSEUDECHINOLAENA** (p. 427).
Blades linear to lanceolate.
First glume wanting (present in a few species of *Paspalum*).
Spikelets in 2 to 4 rows in close 1-sided racemes.
Spikelets (or the primary one of a pair) placed with the back of the fertile lemma (hence the second glume) turned away from the rachis——**93. AXONOPUS** (p. 430).
Spikelets placed with the back of the fertile lemma (hence the second glume) turned toward the rachis.
94. PASPALUM (p. 434).
First glume present.
Spikelets placed with the first glume toward the rachis. Spikelets in close 1-sided racemes.
Racemes several——**92. BRACHIARIA** (p. 430).
Racemes solitary, spikelike.
Racemes erect, the rachis slender; spikelets swollen on the side toward the rachis and fitting into alternate hollows.
90. MESOSETUM (p. 428).
Racemes curved, the rachis broad-winged; spikelets not fitting into hollows——**88. THRASYA** (p. 427).
Spikelets placed with the first glume away from the rachis.
Racemes loose, in a flabellate panicle; spikelets conspicuously silky——**86. TRICHACHNE** (p. 423).
Racemes close, 1-sided, solitary, digitate or racemose.
Racemes racemosely arranged on the main axis.
95. PANICUM (p. 456).
Racemes digitate or fascicled, rarely solitary.
87. SYNTHERISMA (p. 424).

13. ANDROPOGONEAE

Spikelets all perfect.
Inflorescence of digitate racemes——121. ISCHAEMUM (p. 505).
Inflorescence a densely flowered hairy panicle.
Spikelets awned——112. ERIANTHUS (p. 493).
Spikelets awnless.
Rachis continuous——109. IMPERATA (p. 491).
Rachis disarticulating.
Panicle large, pale, plumelike; spikelets all alike.
110. SACCHARUM (p. 492).

Panicle narrow or subcylindric, tawny or golden brown; upper of the pair of spikelets cleistogamous_____111. **ERIOCHRYSIS** (p. 493).

Spikelets not all perfect, the sessile usually perfect, the pedicellate usually staminate or rudimentary.

Fertile spikelet with a hairy-pointed callus formed of the attached supporting rachis joint or pedicel; awns well developed.

Awn plumose or pubescent; rachis continuous.

118. TRACHYPOGON (p. 503).

Awn scabrous, not pubescent; rachis disarticulating.

117. HETEROPOGON (p. 502).

Fertile spikelet without a callus, the rachis disarticulating immediately below the spikelet; awns relatively small or wanting.

Pedicel of the sterile spikelets thickened, appressed to the thickened rachis joint or adnate to it.

Sessile spikelets sunken in cavities of the thickened rachis, the first glume covering the opening. Sterile spikelet obscure.

120. MANISURIS (p. 505).

Sessile spikelet not sunken in the rachis.

Plant annual; sessile spikelet globose.

122. HACKELOCHLOA (p. 506).

Plant perennial; sessile spikelet lanceolate.

119. ELYONURUS (p. 504).

Pedicel of the sterile spikelet distinct, this and the rachis joint usually slender.

Spikelets in reduced racemes of 1 to 5 (rarely 7) joints, these peduncled in open panicles. Awns, if present, commonly deciduous.

Pedicellate spikelets staminate_____115. **HOLCUS** (p. 501).

Pedicellate spikelets wanting, the pedicel only present.

116. SORGHASTRUM (p. 501).

Spikelets in evident racemes of several to many joints.

Margins of the first glume of the sessile spikelet involute, the sides rounded instead of sharply keeled; awn rather stout, geniculate and twisted, about 2 cm. long____114. **HYPARRHENIA** (p. 500).

Margins of the first glume of the sessile spikelet inflexed, the glume sharply 2-keeled, the back flat or grooved between the keels.

113. ANDROPOGON (p. 494).

14. TRIPSACEAE

Pistillate spikelets sunken in recesses in the thickened joints of the rachis.

Inflorescence of solitary or digitate spikes____123. **TRIPSACUM** (p. 506).

Pistillate spikelets inclosed in a bony beadlike involucre__124. **COIX** (p. 507).

DESCRIPTIVE LIST

1. GUADUA Kunth

Spikelets several-flowered, subterete, mostly elongate, sessile or nearly so; stamens 6; palea winged. Our species spiny.

Spikelets glabrous, falcate, 3 to 7 cm. long_____1. **G. angustifolia.**

Spikelets pubescent, 1.5 to 2 cm. long_____2. **G. weberbaueri.**

1. Guadua angustifolia Kunth, Syn. Pl. Aequin. 1: 253. 1822.

Bambusa guadua **Humb. & Bonpl. Pl. Aequin. 168. *pl. 20*. 1808.**

A stout bamboo, as much as 10 meters tall and 15 cm. in diameter; blades about 15 cm. long and 12 to 18 mm. wide; spikelets often curved, at maturity 3.5 to 7 cm. long.

Forests, Colombia to Peru and Guiana. Originally described from Colombia.
PERU: Lima, *Wilkes Expl. Exped.*

Since botanists are not in agreement on the validity of duplicate binomials, no new binominal is here made on the basis of the specific name *guadua.*

2. Guadua weberbaueri Pilger, Repert. Nov. Sp. Fedde **1**: 152. 1905.

A bamboo as much as 10 meters tall, the spreading branches climbing; blades elliptic-lanceolate, 12 to 14 cm. long, 2 to 3.5 cm. wide, pilose beneath, the summit of the sheath long-fimbriate.

Dry shrubby slopes, Peru. Known only from the type collection.

PERU: Moyobamba, *Weberbauer* 4562. A sterile specimen from Colonia Perené (*Hitchcock* 22121) may belong to this species.

GUADUA PARVIFLORA Presl, Rel. Haenk. **1**: 257. 1830.

Bambusa parviflora Roem. & Schult. Syst. Veg. **7**: 1350. 1830.

Arthrostylidium maculatum Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. **3**[1]: 28. *pl.* 5. 1839.

This third species was described from the mountains of Huánuco, Peru. No other collections have been made. Munro[12] includes the species in his monograph of the Bambusaceae as *Arthrostylidium maculatum*, quoting the descriptions of Presl and Ruprecht without having seen a specimen. Camus[13] does the same, but the figure is different from that of Ruprecht, indicating that it may have been drawn from another specimen of the same collection. In the U. S. National Herbarium is a fragment (single branch of the inflorescence) from the type at the German University, Prague. In this fragment the spikelets are distant and appressed to the axis and appear to be only partially developed. They show two glumes with awns as long as the body and a lemma with a shorter awn. The spots on the lemma (emphasized by Presl and by Ruprecht) are very faint. The branch resembles Ruprecht's figure, but the awns are longer than there shown. It does not accord so well with the figure shown by Camus.

On the basis of the data at hand, the genus to which this species should be referred is uncertain. It appears to belong to *Arthrostylidium*, but I have refrained from taking up the specific name first published (*parviflora*) until the species is better known. *Arthrostylidium cubense* Rupr. is accepted as the type species of the genus *Arthrostylidium.*

2. ARUNDINARIA Michx.

Spikelets compressed, few to many-flowered; stamens 3.

Lemmas about 5 mm. long, 0.5 mm. thick ..... **1. A. humillima.**
Lemmas larger, more than 1 mm. wide.
Lemmas short-awned.
Panicle large and diffuse; spikelets long-pediceled; blades 5 to 8 cm. wide. **2. A. patula.**
Panicle condensed; lateral pedicels shorter than the spikelets; blades 2 to 3 cm. wide ..... **3. A. herzogiana.**
Lemmas awnless.
Panicle open, the spikelets long-pediceled; blades triangular-ovate, about 4 cm. long, 12 mm. wide ..... **4. A. haenkei.**
Panicle condensed, the lateral pedicels shorter than the spikelets; blades linear-lanceolate, about 10 cm. long, 9 mm. wide ..... **5. A. hirtula.**

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[12] Trans. Linn. Soc. **26**: 40. 1868.

[13] Les Bambusées 63. *pl. 40. f. c.* 1913.

1. Arundinaria humillima Pilger, Verh. Bot. Ver. Brand. **47**: 100. 1905.

Culms 50 cm. tall; panicle open, 10 cm. long, 2.5 cm. wide; sheaths ciliate with long hairs wrapped around the culm; blades 15 cm. long, 1 cm. wide; spikelets very slender, 1 cm. long, the florets distant.

Represented in the U. S. National Herbarium by only a fragment from the type.

PERU: Cerro de Escaler, Dept. Loreto, *Ule* 6598.

2. Arundinaria patula Pilger, Bot. Jahrb. Engler **25**: 719. 1898.

Arundinaria sodiroana Hack. Oesterr. Bot. Zeitschr. **53**: 70. 1903. (Mount Atacatzo, *Sodiro.*)

A tall bamboo, the culms as much as 3 cm. thick at base; blades ovate lanceolate, as much as 20 cm. long and 7 cm. wide, the mouth and margin of the sheath long-fimbriate; panicle very open and diffuse, as much as 40 cm. long, the branchlets slender, bearing a single spikelet as much as 2 cm. long; lemmas bearing an awn as much as 4 mm. long.

Forested slopes, Colombia to Peru. Originally described from Colombia.

ECUADOR: Mount Atacatzo, *Sodiro.* Mount Corazón, *Mille* 321.

PERU: Playapampa, *Macbride* 4512.

3. Arundinaria herzogiana Henr. Med. Rijks Herb. Leiden **40**: 75. 1921.

Shrubby; blades gradually narrowed from an asymmetrically rounded base, 15 to 25 cm. long, 2 to 3 cm. wide; mouth of sheath long-fimbriate, the hairs 1 to 2 cm. long; panicle rather lax, as much as 30 cm. long; spikelets 2 to 2.5 cm. long.

Known only from the type collection.

BOLIVIA: Río Saujana, in mountain woods, alt. 3,200 meters, *Herzog* 2396.

4. Arundinaria haenkei (Presl) Hack. Oesterr. Bot. Zeitschr. **53**: 63. 1903.

Arthrostylidium haenkei Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. **3**[1]: 27 (117). 1839.

Arundinaria setifera Pilger, Repert. Nov. Sp. Fedde **1**: 145. 1905. (*Weberbauer* 3387.)

A divaricately branched shrub; blades triangular-ovate, gradually narrowed from a rounded base, 3 to 5 cm. long, 12 to 15 mm. wide; panicles terminating all the branches, diffuse, 15 cm. long, the branches long, slender, naked; spikelets as much as 3 cm. long.

Known only from Peru. Originally described from a collection made by Haenke in Peru, the exact locality not known.

PERU, Monzón, Dept. Huánuco, *Weberbauer* 3387. Without locality, *Haenke.*

5. Arundinaria hirtula Pilger, Repert. Nov. Sp. Fedde **17**: 445. 1921.

Culms as much as 10 meters tall and 5 cm. thick; blades 8 to 13 cm. long, 7 to 11 mm. wide; panicle about 13 cm. long; spikelets 2.5 cm. long.

Known only from the type collection, from thickets at 3,100 meters.

PERU: Prov. Pataz, *Weberbauer* 7031.

3. CHUSQUEA Kunth

Spikelets small, with 1 perfect floret and 2 empty lemmas below it; stamens 3; blades disarticulating from the persistent sheaths.

Inflorescence an open panicle, not more than twice as long as wide.

Glumes minute; blades pubescent beneath_____1. C. uniflora.

Glumes obsolete; blades glabrous beneath_____2. C. delicatula.

Inflorescence narrow, more than twice as long as wide, usually condensed, the branches short, appressed, or spreading.

Panicles dense and spikelike, terminating erect branches. Low, upright plants; glumes about 1 mm. long; sterile lemmas acuminate, more than half as long as the spikelet.
Panicle pale ---- 3. C. spicata.
Panicle dark ---- 4. C. weberbaueri.
Panicles narrow but not spikelike, borne on the ends of short, usually fascicled, branches.
Glumes obsolete ---- 5. C. depauperata.
Glumes evident, usually short, sometimes minute.
Inflorescence and branchlets more or less waxy-whitened Spikelets 1 cm. or more long ---- 6. C. huatensis.
Inflorescence and branchlets not waxy-whitened.
Blades pubescent beneath.
Spikelets pubescent; blades lanceolate ---- 7. C. dombeyana.
Spikelets glabrous; blades linear, mostly less than one-twentieth as wide as long ---- 8. C. peruviana.
Blades glabrous beneath.
Spikelets about 11 mm. long. Sterile lemmas long-acuminate, nearly as long as the spikelet ---- 9. C. picta.
Spikelets mostly not over 7 mm. long.
Panicle branches appressed ---- 10. C. serrulata.
Panicle branches spreading, the pedicels sometimes reflexed. 11. C. scandens.

1. Chusquea uniflora Steud. Syn. Pl. Glum. 1: 327. 1854.

Culms 4 mm. thick; fertile branches several in a cluster at the nodes, 10 to 15 cm. long; blades lanceolate, as much as 5 cm. long and 1 cm. wide, glabrous above, pubescent beneath, subulate-pointed; panicles open, loosely flowered, about 5 cm. long; spikelets glabrous, rather broad, 6 to 7 mm. long; glumes minute; sterile lemmas less than half as long as spikelet, acute, slightly mucronate but not subulate-pointed.

Colombia to Bolivia. Originally described from Colombia.

ECUADOR: Quito, *Spruce* 5940.

BOLIVIA: Bella Vista, *Hitchcock* 22753. Doubtfully referred here; blades glabrous beneath.

CHUSQUEA LONGIPENDULA Kuntze, Rev. Gen. Pl. 3²: 348. 1898. Cochabamba, Bolivia, 2,000 meters alt. The type specimen, in the herbarium of the New York Botanic Garden, appears to belong to *C. uniflora*. The spikelets are old and in an unsatisfactory condition for study.

2. Chusquea delicatula Hitchc., sp. nov.

A graceful shrub with long, slender, branching, drooping or trailing fertile culms as much as 3 meters long, 3.5 mm. thick at base, less than 0.5 mm. thick at the flower-bearing tip, usually depending from banks; culms reddish, glabrous, the flowering branches numerous in clusters along the mid culm, as much as 8 cm. long, bearing 4 or 5 leaves, gradually shorter and toward the very slender tip of the culm only 2 cm. long with 1 or 2 reduced leaves; sheaths somewhat keeled toward the summit, hispidulous or glabrate, striate, the summit at each side of the petiole fimbriate with hairs 2 mm. long; ligule thin, 1 mm. long, somewhat pubescent; blades rather thin, narrowly lanceolate, 2 to 3.5 cm. long, 3 to 4 mm. wide, gradually narrowed to a very short petiole, the acuminate tip subulate-pointed, scaberulous on the margin, glabrous beneath, hispidulous on the upper surface along the mid-nerve, rather strongly striate-nerved on upper surface, two pairs of lateral nerves somewhat prominent

beneath; panicles few-flowered, about 2 to 3 cm. long, the axis and branches scabrous-pubescent; spikelets glabrous, slender-fusiform, 5 to 6 mm. long; glumes wanting or represented by slight callosities at the summit of the pedicel; sterile lemmas about equal, about half as long as the spikelet, the strong mid nerve extending into a short subulate point; fertile lemma rather obscurely nerved, acutish but not subulate-pointed; palea obtuse, shorter than the lemma.

Type in the U. S. National Herbarium, no. 1,164,911, collected on moist shady banks at Bella Vista, Nor-Yungas, Bolivia, December 26, 1923, by A. S. Hitchcock (no. 22748).

This differs from other species of the Central Andes in the slender, comparatively delicate culms. The collector was unable definitely to connect the fertile phase with the sterile plants growing in the vicinity. In the fertile plants all the culms were floriferous from near the base to the very apex. The following sterile specimens collected in the vicinity of the fertile plants appear to belong to the same species, since they have the same leaf characters, though the blades are larger (as much as 7 cm. long and 8 mm. wide): Bella Vista, *Hitchcock* 22748, 22749. Another collection of sterile plants made by Buchtien in the same general region appears to be the same species, though the blades are proportionately wider (as much as 7 cm. long and 1 cm. wide): Charopampa, near Mapiri, *Buchtien* 1154.

3. Chusquea spicata Munro, Trans. Linn. Soc. **26**: 60. 1868.

Chusquea simplicissima Pilger, Repert. Nov. Sp. Fedde **1**: 145. 1905. (*Weberbauer* 2217.)

Plants low, erect; blades firm, erect; panicles spikelike, dense, interrupted below, 10 to 15 cm. long.

Among shrubs, Peru and Bolivia. Originally described from Peru, *Lechler* 2154, 2640, 2694, being cited.

PERU: Sachapata, *Lechler* 2154, 2640, 2694 (last two in Kew Herb.). Prov. Tarma, *Weberbauer* 2217.

BOLIVIA: Mapiri, *Rusby* 196.

4. Chusquea weberbaueri Pilger, Repert. Nov. Sp. Fedde **1**: 146. 1905.

Plants erect, as much as 2 meters tall, with appressed firm blades 8 to 12 cm. long and 5 to 6 mm. wide, and spikelike panicles 15 to 30 cm. long; spikelets glabrous, usually dark colored.

Mountain meadows, Colombia to Peru. Originally described from Peru. (Type, *Weberbauer* 4415.)

PERU: Chachapoyas, *Weberbauer* 4415.

5. Chusquea depauperata Pilger, Repert. Nov. Sp. Fedde **1**: 149, 1905.

Blades 4 to 6 cm. long, 3 to 3.5 mm. wide, firm, rigid, the apex subulate, the summit of the sheath without fimbriae; panicle narrow, spikelike, rather dense, 6 to 9 cm. long.

Marshy thickets, Peru. Known only from the type collection.

PERU: Monzón, *Weberbauer* 3709.

Pilger does not give the height of the plant but states that it is "suffrutescens."

6. Chusquea huatensis Pilger, Bot. Jahrb. Engler **56**: Beibl. **123**: 29. 1920.

A high-climbing shrub; blades firm, smooth and glabrous except the scabrous margin, gradually narrowed from a rounded base, the apex extending into a long fine point, 8 to 11 cm. long, 11 to 18 mm. wide, subsessile; panicle con-

tracted, loosely spikelike; spikelets about 1 cm. long; foliage and inflorescence more or less waxy-whitened.

Mountain thickets, Peru. (Type, *Weberbauer* 5581.)

PERU: Prov. Huanta, Dept. Ayacucho, *Weberbauer* 5581. San Miguel, Urubamba Valley, *Cook & Gilbert* 965 (sterile).

7. **Chusquea dombeyana** Kunth, Rév. Gram. 2: 553. *pl. 191.* 1832.

Chusquea pubispicula Pilger, Repert. Nov. Sp. Fedde 1: 148. 1905. (*Weberbauer* 688.)

Culms 5 mm. thick; blades as much as 8 cm. long and 6 mm. wide, slightly pubescent beneath; panicles narrow, interrupted, 8 to 15 cm. long, the axis and branches densely pubescent; spikelets pubescent.

Mountain thickets, Peru, whence originally described. (*Dombey.*)

PERU: Sandía, *Weberbauer* 688. Without locality, *Dombey*, a fragment from the type.

8. **Chusquea peruviana** E. G. Camus, Bamb. Monogr. 88. *pl. 53. f. B.* 1913.

Chusquea ramosissima Pilger, Repert. Nov. Sp. Fedde 1: 149. 1905. Not *C. ramosissima* Lindm. 1900.

Chusquea sandiensis Pilger, Bot. Jahrb. Engler 56: Beibl. 123: 29. 1920.

Blades linear, 7 to 9 cm. long, 2.5 to 3.5 mm. wide, sparsely long-pilose beneath, the apex produced into a setaceous point; panicle narrow, few-flowered, 8 to 10 cm. long, the rachis scabrous.

Mountain thickets, Ecuador to Bolivia. Originally described from Sandía, Peru. (Type, *Weberbauer* 694.)

ECUADOR: Chanchán River, *Spruce* 6093. Huigra, *Hitchcock* 20741 (sterile); *Rose* 22292 (sterile).

PERU: Sandía, *Weberbauer* 694. Torontoy, *Heller* 2180 (sterile).

BOLIVIA: Bella Vista, *Hitchcock* 22746; fertile culms 7 meters tall, erect, the flowering branches very numerous in large tufts at the nodes. Sterile specimens that appear to belong to this species: Bella Vista, *Hitchcock* 22744, 22745.

9. **Chusquea picta** Pilger, Repert. Nov. Sp. Fedde 1: 151. 1905.

Blades 5 to 7 cm. long, 3 to 3.5 mm. wide, setaceous-pointed; panicle 5 to 9 cm. long, narrow, few-flowered; spikelets about 11 mm. long, glabrous, the glumes very short.

Known only from the type collection.

PERU: "In andina nemoribus," *Ruiz.* Specimen in the Berlin Herbarium.

10. **Chusquea serrulata** Pilger, Bot. Jahrb. Engler 25: 719. 1898.

Chusquea spadicea Pilger, Bot. Jahrb. Engler 27: 35. 1899.

Differing from *C. scandens* in the narrow, more distinctly striate blades and in the narrow panicle with appressed branches.

Along trails in forest, Colombia, whence originally described, to Bolivia.

ECUADOR: Mount Corazón, *Sodiro* in 1891. Mount Atacatzo, *Mille* 320. Between La Toma and Loja, *Hitchcock* 21388.

PERU: Mito, *Macbride & Featherstone* 1687.

BOLIVIA: Coroico, *Bang* 2348. Bella Vista, *Hitchcock* 22750. La Paz, *Rusby* 10.

11. **Chusquea scandens** Kunth, Syn. Pl. Aequin. 1: 254. 1822.

Nastus chusquea[14] H. B. K. Nov. Gen. & Sp. 1: 201. 1816.

Chusquea jamesoni Steud. Syn. Pl. Glum. 1: 337, 1854. (Andes, Peru, *Jameson* 631).

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[14] Since botanists are not in agreement on the use of duplicate binomials, the specific name *chusquea* is not taken up.

Chusquea quitensis Hack. Oesterr. Bot. Zeitschr. **53**: 154. 1903. (Mount Pichincha, *Sodiro*.)

Chusquea quitensis var. *patentissima* Hack. Repert. Nov. Sp. Fedde **6**: 161. 1908. (*Buchtien* 839.)

Chusquea meyeriana var. *patentissima* E. G. Camus, Bamb. Monogr. 94. 1913.

Blades linear-lanceolate, as much as 18 cm. long, 1 to 2.5 cm. wide, smaller on the branches, narrowed to a fine point; panicle narrow, rather dense, mostly 8 to 12 cm. long but sometimes as much as 20 cm. long, the branches spreading, the pedicels often reflexed.

Forests, Colombia to Peru. Originally described from Bogotá, Quito, and Loja.

ECUADOR: Quito, *Jameson* 630. Mount Pichincha, *Mille* 319. Between Otavalo and Malchinguí, *Hitchcock* 20825. Mount Corazón, *Lehmann* 473. Zaragura, *Rose* 23149. Las Juntas, *Rose* 23201.

PERU: Panao, *Macbride & Featherstone* 2212. Yanano, *Macbride* 3778.

BOLIVIA: Bella Vista, *Hitchcock* 22742, 22747, 22750. Coroico, *Hitchcock* 22725. Río Saujana, *Herzog* 2383. Unduavi, *Buchtien* 839, 4185. Without locality, *Bang* 1826.

Four other species of *Chusquea* have been described from our region by Doctor Pilger, who has kindly sent the writer fragments from the type specimens. From the material at hand they can not be satisfactorily distinguished from *C. serrulata*, to which they would lead in the key. The species are:

CHUSQUEA POLYCLADOS Pilger, Repert. Nov. Sp. Fedde **1**: 147. 1905. (Near Hualgayoc *Weberbauer* 4021.)

CHUSQUEA STRAMINEA Pilger, Repert. Nov. Sp. Fedde **1**: 147. 1905. (Chachapoyas, *Weberbauer* 4408.)

CHUSQUEA INAMOENA Pilger, Repert. Nov. Sp. Fedde **1**: 150. 1905. (Prov. Tarma, *Weberbauer* 2295.)

CHUSQUEA TARMENSIS Pilger, Repert. Nov. Sp. Fedde **1**: 151. 1905. (Prov. Tarma, *Weberbauer* 2129.)

4. MEROSTACHYS Spreng.

Spikelets with 1 perfect floret and 1 or 2 sterile lemmas, the rachilla prolonged behind the many-nerved palea; stamens 3; inflorescence a 1-sided spike.

1. Merostachys brevispica Munro, Trans. Linn. Soc. **26**: 49. 1868.

Sheaths densely fimbriate; blades oblong-lanceolate, those of the branches 7 to 10 cm. long, 10 to 15 mm. wide; inflorescence arcuate, 4 to 5 cm. long; spikelets about 1 cm. long, the rachis velvety-pubescent.

Forests, known only from the type collection.

PERU: Tarapoto, *Spruce* in 1856.

5. NEUROLEPIS Meisn.

(*Platonia* Kunth, 1830. Not *Platonia* Mart. 1829. *Planotia* Munro.)

Spikelets with 2 glumes, 2 sterile lemmas and a terminal perfect floret, in elongate panicles; stamens 3. Culms erect, herbaceous or somewhat woody at base, the blades elongate, mostly more than 50 cm. long and 6 cm. wide.

Sheaths (at least the lower) pubescent; panicles pale; spikelets 3 mm. long. **1. N. stuebelii.**

Sheaths glabrous; panicles dark; spikelets 4 mm. long **2. N. aristata.**

1. **Neurolepis stuebelii** (Pilger) Pilger in Engl. & Prantl, Pflanzenfam. Ergänz. 2: 21. 1906.

Planotia stuebelii Pilger, Bot. Jahrb. Engler 25: 720. 1898.

An erect bamboo, 2 to 3 meters tall, with a loose rhizomatous base; sheaths more or less pubescent; blades as much as 1 meter long and 6 cm. wide, sometimes sparsely pilose; panicle as much as 50 cm. long, rather open, the branches rather distant, densely flowered; glumes long-acuminate.

Forested slopes, Colombia, whence originally described, and Ecuador.

ECUADOR: Tungurahua, *Sodiro* in 1901. Lake Colta, *Mille* 318.

2. **Neurolepis aristata** (Munro) Hitchc.

Chusquea aristata Munro, Trans. Linn. Soc. 26: 61. 1868.

A stout erect bamboo, 2 to 3 meters tall, the culms about 1 cm. thick at base; sheaths ciliate; blades glabrous, somewhat tesselate, 30 to 40 cm. long, 3 cm. wide; panicle dark colored, dense, 30 to 40 cm. long, the branches ascending or appressed, the lower as much as 15 cm. long, the rachis strongly sulcate and scabrous-pubescent; glumes glabrous, long-acuminate.

Forested slopes, Ecuador.

ECUADOR: Between Malchinguí and Pomasqui, *Hitchcock* 20863, Santa Bárbara, *André* 4499 (Kew Herb.). Without locality, *Jameson* 92 (Kew Herb.).

The type specimen (*Jameson* 92) in the Kew Herbarium, kindly submitted by the director for examination, is only the upper part of the culm, including panicle and a few upper leaves. Munro seems to have referred the species to *Chusquea* largely because of the short blades (about 15 cm. long). Hitchcock's no. 20863, which is evidently the same as Jameson's no. 92, has the characteristic habit of *Neurolepis*, with elongate lower blades as much as 4 cm. wide.

NEUROLEPIS ELATA (Kunth) Pilger in Engl. & Prantl, Pflanzenfam. Ergänz. 2: 21. 1906. *Platonia elata* Kunth, Rév. Gram. 1: 139. 1829; 2: 327. *pl.* 76. 1830. This species has not been identified. The plate shows a narrow open panicle, narrow blades 2 cm. wide, and acute but awnless glumes and lemmas. Originally described from Loja, Ecuador.

NEUROLEPIS WEBERBAUERI Pilger, Repert. Nov. Sp. Fedde 17: 446. 1921. This species is said to differ from *N. elata* (Kunth) Pilger in the wider panicle, shorter first glume, and the much broader second glume and sterile lemmas. Known only from the type collection, Dept. Libertad, Prov. Pataz, Peru, *Weberbauer* 7030. A fragment of this is in the U. S. National Herbarium.

6. STREPTOCHAETA Schrad.

Spikelets 1-flowered, terete, disarticulating below the glumes; empty bractlets (probably glumes and sterile lemmas) 4, much shorter than the spikelet, more or less toothed; lemma coriaceous, gradually narrowed into a long much contorted awn; palea shorter than the lemma, bifid nearly to the base, coriaceous; inner bracts (lodicules) 3, less coriaceous than the lemma, longer than the palea, imbricate; stamens 6, monadelphous, the tube about as long as the lemma; style 1, as long as the stamen tube, the slender stigmas 3.—Broad-leaved perennials with the spikelets in elongate spikes. The long contorted awns are implicate, remaining attached at the apex of the axis, the spikelets hanging down.

This anomalous genus is not closely related to any other and can not be placed in any of the recognized tribes.

Spikelets about 14 mm. long (excluding awns)_____1. S. sodiroana.
Spikelets about 22 mm. long_____2. S. spicata.

1. **Streptochaeta sodiroana** Hack. Oesterr. Bot. Zeitschr. 40: 113. 1890.

A rather stout perennial about 1 meter tall, with elliptic tessellate blades 15 to 20 cm. long and 6 to 7 cm. wide, and a many-flowered dense spike about 30 cm. long.

Forests, 2,000 to 3,000 meters altitude, Costa Rica to Ecuador. Originally described from San Miguel, on the Peripa River. (*Sodiro.*)

ECUADOR: Peripa River, *Sodiro.* Mount Chimborazo, *Lehmann* 4400 (Kew Herb.).

2. **Streptochaeta spicata** Schrad.; Nees, Agrost. Bras. 537. 1829.

Lepideilema lancifolium Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 1: 93. 1830.

Differing from *S. sodiroana* in the few-flowered slender spike of larger spikelets.

Forests, Brazil, whence originally described, to Trinidad and Ecuador.

ECUADOR: El Recreo, *Eggers*, 14863.

7. BROMUS L. BROMEGRASS

Spikelets several to many-flowered; glumes unequal, shorter than the florets; lemmas convex or keeled, 5 to 9-nerved, awnless or awned from between two minute teeth.

Awn twisted; teeth of lemma prominent, 2 to 3 mm. long. Plant annual.
1. B. trinii.

Awn straight, sometimes obsolete; teeth of lemma minute.
Culms mostly less than 10 cm. tall; lemmas densely woolly. A dwarf perennial_____2. B. villosissimus.
Culms normally much more than 10 cm. tall; lemmas glabrous or pubescent but not densely woolly.
Spikelets strongly compressed-keeled; lemmas glabrous, scabrous or sparsely pilose along the principal nerves, not pubescent or villous, 1 to 2 cm. long, gradually narrowed above, awnless or awned, striate-nerved, the nerves 9 to 11.
Awn not more than 5 mm. long, sometimes wanting_____3. B. unioloides.
Awn 1 to 1.5 cm. long_____4. B. striatus.
Spikelets not strongly compressed-keeled; lemmas pubescent. Panicle branches slender and flexuous.
Branches villous-pubescent; lemmas densely pubescent on the margins.
5. B. lanatus.
Branches scabrous; lemmas somewhat pubescent on the margins or short-pubescent all over_____6. B. pitensis.

1. **Bromus trinii** Desv. in Gay, Fl. Chil. 6: 441. 1853.

Trisetum barbatum Steud. Syn. Pl. Glum. 1: 229. 1854.

An erect annual 20 to 60 cm. tall, with flat, sparsely villous blades and narrow, more or less open panicles, the lower branches in whorls, slender, naked below, often flexuous, sometimes with shorter ones intermixed.

Fields and waste places, Chile to California. Originally described from southern Chile.

PERU: Obrajillo, *Wilkes Expl. Exped.* Matucana, *Macbride & Featherstone* 227, 231, 378a. Cuzco, *Hitchcock* 22495.

BOLIVIA: Sorata, *Mandon* 1370.

2. Bromus villosissimus Hitchc. Proc. Biol. Soc. Washington **36**: 195. 1923.

A dwarf cespitose perennial, with ascending culms mostly less than 10 cm. tall, loosely involute, pubescent blades mostly less than 5 cm. long, and simple condensed panicles 1 to 2 cm. long, of 3 to 8 broad woolly spikelets.

Alpine slopes, Peru. (Type, *Macbride & Featherstone* 854.)

PERU: Casapalca, *Macbride & Featherstone* 854. Between Casa Cancha and Culnai, *Wilkes Expl. Exped.*

3. Bromus unioloides H. B. K. Nov. Gen. & Sp. **1**: 151. 1816.

Bromus catharticus Vahl, Symb. Bot. **2**: 22. 1791. (Lima.)
Festuca unioloides Willd. Hort. Berol. 3. *pl. 3*. 1816.
Bromus willdenovii Kunth, Rév. Gram. **1**: 134. 1829.
Ceratochloa haenkeana Presl, Rel. Haenk. **1**: 285. 1830.
Ceratochloa secunda Presl, Rel. Haenk. **1**: 285. 1830.
Bromus preslii Kunth, Rév. Gram. **1**: Suppl. XXXII. 1830.
?*Bromus mathewsii* Steud. Syn. Pl. Glum. **1**: 323. 1854. (*Mathews* 54, Peru.)
Ceratochloa simplex Nees; Steud. Syn. Pl. Glum. **1**: 323. 1854, as synonym of *Bromus mathewsii*.
Bromus angustatus Pilger, Bot. Jahrb. Engler **25**: 719. 1898. (*Stübel* 60e.)

An erect, spreading, or prostrate annual or short-lived perennial with culms 50 to 100 cm. tall (dwarf alpine plants sometimes only 10 to 15 cm.), flat, mostly glabrous blades and simple or open, spreading panicles as much as 30 cm. long. Very variable in size of plant and of panicle, the awn from 1 to 5 mm. long, or sometimes wanting.

Moist soil, fields, ditches, and grassy slopes, Colombia to Argentina and Chile; introduced in southern United States. Originally described from near Quito. (*Bonpland.*)

ECUADOR: Tulcán, *Hitchcock* 20974, 21027. Quito, *Harteman* 8, 47; *Holway* 901; *Rose* 23573. Mount Pichincha, *Harteman* 3, 17. Quebrada Chalán, *Anthony & Tate* 435. Riobamba, *Mille* 51; *Holway* 864; *Spruce* 5815, 5816; Alausí, *Hitchcock* 20689. Between Loja and San Lucas, *Hitchcock* 21488. Cuenca, *Rose* 22915. Tixán, *Rose* 22404. Cumbe, *Rose* 22958.

PERU: Goyllarisquisca, *Hitchcock* 22290, 22324. Cerro de Pasco, *Hitchcock* 22230. Hacienda Atocsaico, *McKenzie* in 1924; *Hitchcock* 22210. Tarma, *Hitchcock* 22159. Yanahuanca, *Macbride & Featherstone* 1253. Río Blanco, *Macbride & Featherstone* 647, 651. Matucana, *Macbride & Featherstone* 253. Lima, *Hitchcock* 22324. Cuzco, *Hitchcock* 22467, 22478, 22489; *Holway* 747. Arequipa, *Hitchcock* 22430. Juliaca, *Harlan* in 1914.

BOLIVIA: Lake Titicaca, *Stübel* 60e. Sorata, *Rusby* 225; *Mandon* 1367 (Kew Herb.). La Paz, *Buchtien*, 843, 844, 845, 2476, 2478, 2480, 2481; *Holway* 429, 456, 471; *Rose* 18868. Unduavi, *Buchtien* 6414. Palca, *Buchtien* 2532, 2543; *Hitchcock* 22561, 22562, 22582. La Florida, *Hitchcock* 22611. Cotaña *Buchtien* 3130. Achacache, *Mandon* 1369. Cochabamba, *Holway* 415; *Hitchcock* 22810. Calderillo, *Fiebrig* 2904. Atocha, *Hitchcock* 22877. Oploca, *Hitchcock* 22894, 22899.

This species is very variable in the size of the spikelet and in the length of the awn. Different forms have been given different names, but it seems impossible to coordinate the variations so as definitely to distinguish distinct species.

The form cultivated in the southern United States as rescue grass has large, strongly striate, awnless or short-awned spikelets. This was named *Festuca unioloides* Willd. The plants from which the species was described were grown in the Berlin Botanic Garden from seed said to come from Carolina. The type specimen of *Festuca unioloides* has been examined. The lemmas are about 1.5 cm. long, acuminate, awnless or with a mucro about 1 mm. long, and puberulent especially toward the margin. Lemmas in specimens of rescue grass vary from glabrous to scabrous or puberulent, in length from 1 to 2 cm., and in length of awn from awnless to 4 mm.

In South America there is in Argentina and Chile the form described in the preceding paragraph and in addition forms with longer awns. Throughout the Andes within the range of this flora at altitudes up to 4,500 meters the common form agrees with the type of *Bromus unioloides*, which appears to have been described independently or *Festuca unioloides*. The type, at the Paris Herbarium, collected near Quito, has been examined. The spikelets are about 2.5 cm. long and 5 mm. wide. The lemmas are about 1.5 cm. long, scaberulous all over but not pubescent, the awns of the lower lemmas about 2 mm. long and of the upper ones about 4 mm. long. The Andean specimens have on the average, as compared with rescue grass of the United States, shorter lemmas (1 to 1.5 cm.), the surface scaberulous or glabrous, and longer awns (1 to 5 mm.).

The Andean form gradually merges with those found in Argentina and Chile. Under the circumstances it would appear best to consider all these forms as belonging to a polymorphous species. The name to be used presents another problem. *Bromus catharticus*, described from Lima in 1791, has precedence over *B. unioloides* (1816). From the plate and description of *B. catharticus* one is uncertain as to the form, but it evidently is conspecific with *Bromus unioloides* in the broad sense.

The name *B. catharticus* is not here taken up because it does not seem advisable to replace the well-known name *B. unioloides* until all the forms and allies have been more thoroughly studied and the type of *B. catharticus* can be examined and its identity with one of the forms can be established.

4. Bromus (Sect. CERATOCHLOA) **striatus** Hitchc., sp. nov.

Annual; culms glabrous or slightly pubescent below the nodes, erect, about 4-noded, 50 to 80 cm. tall; sheaths retrorsely pilose or the upper nearly glabrous, striate, the upper shorter than the internodes; ligule ovate-truncate, lacerate-toothed pubescent, 2 to 3 mm. long; blades flat, rather lax, sparsely short-pilose, mostly 10 to 15 cm. long, 4 to 8 mm. wide; panicle open, nodding, 10 to 15 cm. long, the axis glabrous below, scabrous above, the branches mostly in pairs, distant, slender, flexuous or drooping, scabrous, 2 to 6 cm. long, bearing 1 or 2 spikelets, the rachilla joints about 3 mm. long, scaberulous; spikelets oblong, strongly compressed, mostly 5 or 6-flowered, without the awns 2.5 to 3 cm. long, rather conspicuously striate; glumes acuminate, glabrous, scabrous on the keel, hyaline-margined, the first 3-nerved, about 1 cm. long, the second with 5 strong nerves and a faint additional pair near the margin, about 14 mm. long; lemmas about 1.5 cm. long, rather narrow, glabrous or scaberulous, scabrous on the keel, 7-nerved, narrowly hyaline-margined, gradually narrowed to the minutely toothed apex, the awn slender, erect, mostly 12 to 18 mm. long; palea a little shorter than the lemma, strongly compressed, gradually narrowed to a fine point, the keels hispidulous with strong rather distant hairs, the apex with 2 slender awnlike teeth.

Type in the U. S. National Herbarium, no. 1,164,908, collected on sandy hills near Mollendo, Peru, November 17, 1923, by A. S. Hitchcock (no. 22386).

No other collection has been seen. The species is allied to *Bromus unioloides*, especially the longer-awned form described as *Ceratochloa secunda* Presl, but differs in the more strongly compressed spikelets, the more strongly nerved lemmas, the longer awns, and the coarser ciliation on the keels of the palea. *Bromus striatus* is also allied to *B. carinatus* of California. The latter species rarely has awns as long as in *B. striatus*, nor are the spikelets usually so strongly compressed nor the lemmas so conspicuously nerved. In *B. carinatus* the branches of the panicle are usually stiffer and in the larger panicles more than 2 at a node. The specimens of *B. carinatus* do not possess the combination of characters shown by *B. striatus*, especially the slender flexuous or drooping pedicels, the broad strongly compressed spikelets, the strongly nerved lemmas, and the long, slender awns.

The region around Mollendo is a sandy desert, but at the time the collection was made the hills were green with vegetation from recent rains.

5. Bromus lanatus H. B. K. Nov. Gen. & Sp. 1: 150. 1816.

Festuca mollis Kunth, Rév. Gram. 1: 132. 1829.

Bromus oliganthus Pilger, Bot. Jahrb. Engler 25: 718. 1898. (Originally described from Ecuador, *Stübel* 20c, 61b, 207a, 230a, being cited; *Stübel* 1202 from Colombia is also cited.)

Bromus pflanzii Pilger, Bot. Jahrb. Engler 49: 189. 1912. (Palca, Bolivia, *Pflanz* 272, 274; Takapaya, *Pflanz* 349.)

An erect, loosely tufted perennial, with glabrous or more or less pubescent culms 30 to 60 cm. tall, flat blades, villous on the upper surface and sometimes also beneath, and loose, open, rather few-flowered, nodding panicles, the axis and slender flexuous branches velvety-pubescent.

Paramos and alpine slopes, Colombia to Bolivia. Originally described from Antisana, Ecuador. (*Bonpland.*)

ECUADOR: Tulcán, *Hitchcock* 20922, 21039. Mount Pichincha, *Sodiro* in 1874; *Mille* 237; *Holmgren* 166, 298. Chillogallo, *Sodiro* in 1887. Mount Atacatzo, near Quito, *Harteman* 78. Mount Chimborazo, *Hitchcock* 21958, 21979, 22003. Prov. Imbabura, *Stübel* 61b.

PERU: Río Blanco, *Macbride & Featherstone* 801. Huarón, *Macbride & Featherstone* 1150. Lagunillas, *Harlan* in 1914. Without locality, *Wilkes Expl. Exped.* Sumbay, *Weberbauer* 6902 (Field Mus.).

BOLIVIA: Comanche, *Asplund* 6459. Rinconada, *Asplund* 6458. Cochabamba, *Holway* 346½, 382.

6. Bromus pitensis H. B. K. Nov. Gen. & Sp. 1: 152. 1816.

Bromus lenis Presl, Rel. Haenk. 1: 262. 1830. (Huánuco, Peru.)

Bromus tenuis Presl; Steud. Syn. Pl. Glum. 1: 319. 1854, error for *B. lenis*.

Bromus frigidus J. Ball, Journ. Linn. Soc. Bot. 22: 63. 1885. (Casapalta, Peru.)

Bromus buchtienii Hack. Repert. Nov. Sp. Fedde 11: 30. 1912. (*Buchtien* 2538.)

An erect or spreading perennial as much as 1.5 meters tall, with flat, glabrous or more or less pilose blades, and open, drooping, or nodding panicles as much as 30 cm. long, the branches slender and somewhat flexuous, naked below, bearing 1 to few spikelets.

Fields, banks, and grassy slopes, Ecuador to Bolivia. Originally described from the Pita River near Quito, Ecuador. (*Bonpland.*)

ECUADOR: Tulcán, *Hitchcock* 21018, 21028. La Rinconada Ranch, *Hitchcock* 20799. Between Otovalo and Malchinguí, *Hitchcock* 20829. Between Malchinguí and Pomasqui, *Hitchcock* 20864. Pifo, *Mille* 240. Mount Pichincha, *Sodiro* in 1887; *Harteman* 4, 15. Quito, *Mille* 238; *Sodiro* in 1890. Ambato, *Hitchcock* 21711, 21718; *Pachano* 96. Riobamba, *Mille* 55, 240½, 246. Huigra, *Hitchcock* 20760; *Rose* 22473. Between Loja and San Lucas, *Hitchcock* 21468.

PERU: Goyllarisquisca, *Hitchcock* 22312, 22325, 22326. La Quinhua, *Hitchcock* 22268, 22272. Cerro de Pasco, *Hitchcock* 22231. Ollantaytambo, *Hitchcock* 22530, 22531. Río Blanco, *Macbride & Featherstone* 643. Baños, *Wilkes Expl. Exped.* Casapalta, *Ball* in 1882 (Kew Herb.).

BOLIVIA: Sorata, *Mandon* 1365, 1366, 1368 (Kew Herb.); *Holway* 552. Pongo, *Hitchcock* 22762, 22776. Unduavi, *Buchtien*. La Paz, *Buchtien* 518. Palca, *Buchtien* 2538.

The specimens assigned to each of the last two species are rather diverse among themselves. The material could not be satisfactorily separated by distinctive characters.

BROMUS CALDASII H. B. K. Nov. Gen. & Sp. 1: 151. 1816. Vicinity of Quito. Doctor Lecomte kindly sent me a spikelet from the type specimen at Paris. I have not been able to identify it with any of the species described above. The glumes are narrow, the first 4 mm., the second 6 mm. long; the lemmas narrow, scaberulous, 1.5 cm. long., with a mucro 0.5 to 1 mm. long.

BROMUS SEGETUM H. B. K. Nov. Gen. & Sp. 1: 151. 1816. Vicinity of Quito. Doctor Lecomte also sent a spikelet from the type specimen of this species. The lemmas are scabrous all over and bear an awn about as long as the body. The spikelet is on a slender flexuous scabrous pedicel about 4 cm. long. It appears to be the same as some of the specimens assigned to *B. pitensis*.

8. BRACHYPODIUM Beauv.

Spikelets many-flowered, narrow, nearly terete, short-pediceled in a simple raceme; lemmas usually awned from the tip, 7 to 9-nerved; palea with stiffly ciliate keels.

1. Brachypodium mexicanum Link, Hort. Berol. 1: 41. 1827.

Festuca scabra Lag. Gen. & Sp. Nov. 4. 1816. Not *F. scabra* Vahl, 1791.

A slender wiry straggling perennial, with flat blades and racemes about 5 cm. long, the spikelets 1.5 to 2 cm. long, rather distant, at first appressed, finally spreading or reflexed.

Shady banks, Mexico to Bolivia. Originally described from Mexico.

ECUADOR: Tulcán, *Hitchcock* 21009. Quito, *Harteman* 41; *Holway* 886; *Sodiro* in 1896; *Mille* 294. Latacunga, *Sodiro* in 1891. Without locality, *Spruce* 5917 (Kew Herb.).

PERU: Baños, *Wilkes Expl. Exped.* Goyllarisquisca, *Hitchcock* 22298. La Quinhua, *Hitchcock* 22259. Cuzco, *Hitchcock* 22482, 22488.

BOLIVIA: Sorata, *Holway* 544. Cochabamba, *Hitchcock* 22855; *Holway* 409.

9. FESTUCA L. FESCUE

Spikelets few to several-flowered; glumes small; lemmas firm, convex, or keeled toward the summit only, awned from the tip (rarely from between minute teeth), sometimes acuminate or mucronate only.

Plants annual. Panicles narrow; florets narrow, long-awned.

Lemmas ciliate toward the apex; first glume very short, usually less than 1 mm. Panicles usually more than 10 cm. long----------**1. F. megalura.**

Lemmas not ciliate; first glume mostly 2 mm. long or more.
Lemmas about 5 mm. long; panicles usually less than 6 cm. long.
2. F. australis.
Lemmas about 1 cm. long; panicles 5 to 10 cm. long_____3. F. bromoides.
Plants perennial.
Panicles open, more than 10 cm. long.
Lemmas villous_____4. F. dasyantha.
Lemmas glabrous or scabrous.
Blades thin and lax, flat; lemmas awned, the awn about as long as the body.
Second glume 3-nerved, lemmas compressed, the nerves distinct; awn from between the minute teeth of the bifid apex of the lemma, straight_____5. F. presliana.
Second glume 1-nerved, narrow; lemmas nearly terete, the nerves obscure; awn terminal, becoming flexuous and implicate.
6. F. ulochaeta.
Blades firm, flat or involute; lemmas awnless or if awned the awn shorter than the body.
Lemmas 10 to 12 mm. long. Plants robust, 1 to 3 meters tall.
Ligule about 1 cm. long_____7. F. dichoclada.
Ligule 1 to 3 mm. long.
First glume 2 to 4 mm. long; ligule about 3 mm. long.
8. F. eminens.
First glume 5 to 6 mm. long; ligule about 1 mm. long.
9. F. quadridentata.
Lemmas 5 to 7 mm. long.
Basal sheaths becoming fibrous_____10. F. compressifolia.
Basal sheaths not becoming fibrous.
Blades flat_____11. F. procera.
Blades involute, or sometimes some of the culm blades flat.
12. F. sublimis.
Panicles contracted, or, if somewhat open, less than 10 cm. long.
Panicles short, mostly less than 5 cm. long, few-flowered, the lower branches naked for 1 to 2 cm.
Culms and panicle branches becoming flexuous or S-shaped in fruit, the panicle as a whole finally deciduous from the plant; glumes awn-pointed; lemmas toothed at the base of the awn.
13. F. casapaltensis.
Culms and panicle branches remaining straight or nearly so, the panicle not deciduous; glumes acute; lemmas not toothed.
14. F. parvipaniculata.
Panicles narrow, many-flowered, mostly more than 5 cm. long, the branches appressed, some of each fascicle floriferous nearly to base.
Panicles spikelike, mostly less than 8 cm. long, the leaves in a short basal cluster.
Culm scabrous; glumes 7 mm. long_____15. F. breviaristata.
Culm smooth; glumes 1 to 5 mm. long.
First glume 1 to 2 mm. long_____16. F. andicola.
First glume 3 to 4 mm. long_____17. F. rigescens.
Panicles narrow, usually elongate, if as short as 8 cm. scarcely spikelike.
Lemmas pubescent on the margins_____18. F. orthophylla.
Lemmas not pubescent on the margins.
Lemmas thin, scarious at the summit_____19. F. glyceriantha.
Lemmas not thin and scarious-tipped_____20. F. dolichophylla.

1. Festuca megalura Nutt. Journ. Acad. Phila. II. 1: 188. 1848.

An erect or spreading annual, with narrow panicles mostly more than 10 cm. long; lemmas ciliate.

Open ground and waste places, British Columbia to Chile. Originally described from California.

ECUADOR: Quito, *Arcade* 15. Baños, *Hitchcock* 21923; *Lehmann* 5286a (Kew Herb.). Huigra, *Hitchcock* 20762. Pomasqui, *Sodiro* in 1894; *Mille* 279. Riobamba, *Spruce* 5958.

PERU: Tarma, *Hitchcock* 22144. La Quinhua, *Macbride & Featherstone* 2032. Baños, *Wilkes Expl. Exp.* Mito, *Macbride & Featherstone* 1729. Matucana, *Macbride & Featherstone* 226. Río Blanco, *Macbride & Featherstone* 653. Ollantaytambo, *Cook & Gilbert* 478. Cuzco, *Hitchcock* 22474, 22506. Mollendo, *Hitchcock* 22387. Juliaca, *Harlan* in 1914.

BOLIVIA: Sorata, *Mandon* 1363. Pongo, *Hitchcock* 22760. La Paz, *Buchtien* 854. Talca Chugiaguilla, *Bang* 807. Bolivian Plateau, *Bang* 1105. Pasña, *Asplund* 6416. Calderillo, *Fiebrig* 3159. Cochabamba, *Hitchcock* 22829.

2. Festuca australis Nees; Steud. Syn. Pl. Glum. 1: 304. 1854.

An erect or spreading annual, with slender culms 10 to 30 cm. tall and narrow densely flowered panicles mostly not over 6 cm. long.

Fields, open ground, and waste places throughout South America at temperate altitudes. Originally described from Brazil.

ECUADOR: La Rinconada Ranch, *Hitchcock* 20938. Between Malchinguí and Pomasqui, *Hitchcock* 20865. Urbina, *Hitchcock* 22028. Alausí, *Hitchcock* 20707. Quito, *Hartweg* 1454 (Kew Herb.); *Jameson* 257, 304 (both Kew Herb.).

PERU: Goyllarisquisca, *Hitchcock* 22287, 22309.

3. Festuca bromoides L. Sp. Pl. 75. 1753.

An erect annual as much as 50 cm. tall with densely flowered panicles mostly 7 to 10 cm. long.

Open ground, introduced from Europe in several places in South America.

ECUADOR: Quito, *Arcade* 1, 4; *Harteman* 50, 71; *Sodiro* 278.

4. Festuca dasyantha H. B. K. Nov. Gen. & Sp. 1: 154. 1816.

A rather slender perennial about 1 meter tall, with flat blades and narrow, somewhat open panicles 15 to 25 cm. long, the branches ascending.

Grassy alpine slopes, Ecuador. Originally described from Cotopaxi.

ECUADOR: Near Quito, *Sodiro* in 1904, 280.

5. Festuca presliana Hitchc.

Bromus depauperatus Presl, Rel. Haenk. 1: 263. 1830. Not *Festuca depauperata* Bertol, 1834.

While at Prague the writer examined the type specimen of *Bromus depauperatus* at the herbarium of the National Museum. The species is published as from Nootka Sound (Vancouver Island). It is evidently a species of *Festuca*, but neither the specimen nor the description corresponds with any species of *Festuca* in North America. It is allied to *F. elmeri* Scribn. & Merr. but is distinct from that species. The label accompanying the type specimen bears no data other than the name, and there would appear to be no reason for having assigned Nootka Sound as the locality.

In the U. S. National Herbarium there is a specimen from Baños, Peru, collected by the Wilkes exploring expedition, which agrees with *Bromus depauperatus*. Baños is in the central Andes and is in the general region of Huánuco, where Haenke made large collections. It seems very probable that the type came from Peru and that the locality as published is an error.

The species is tall and slender, characterized by flat blades, large open panicle and awned spikelets. The awn is nearly or quite as long as the 5-nerved scaberulous lemmas, and proceeds from between two slender, minute but well-defined teeth at the apex. In this last character it agrees with *Festuca elmeri.*

6. Festuca ulochaeta Steud. Syn. Pl. Glum. **1**: 305. 1854.

Festuca leptothrix Trin.; Doell in Mart. Fl. Bras. **2**^{3}: 115. 1878.

A lax perennial about 1 meter tall, with thin flat blades 5 mm. wide and open panicles 15 to 20 cm. long.

Shady slopes, Ecuador to Bolivia and Brazil, whence originally described.

ECUADOR: Mount Pichincha, *Sodiro* in 1887. Tulcán, *Hitchcock* 21042.

PERU: Ollantaytambo, *Hitchcock* 22532.

BOLIVIA: Unduavi, *Buchtien* 6415.

7. Festuca dichoclada Pilger, Bot. Jahrb. Engler **37**: 514. 1906.

Culms as much as 2 meters tall, stout, the blades 6 to 7 mm. wide, more or less involute; ligule as much as 1 cm. long; panicle large and spreading, the branches naked at the base; first glume 5 to 6 mm. long, the second 7 to 8 mm. long; lemmas about 1 cm. long, scaberulous, acute, 5-nerved. Differing from *F. eminens* in the longer glumes, shorter lemmas, and longer ligule.

Mountain sides, Ecuador and Peru, whence originally described. (Type, *Weberbauer* 3230.)

ECUADOR: Gualea, *Sodiro* in 1890; *Mille* 287.

PERU: Caraz, *Weberbauer* 3230. Ollantaytambo, *Cook & Gilbert* 510. Río Blanco, *Macbride* 3045.

8. Festuca eminens Kunth, Rév. Gram. **1**: 132. 1829.

Bromus procerus H. B. K. Nov. Gen. & Sp. **1**: 150. 1816. Not *Festuca procera* H. B. K. 1816.

A rather stout perennial 1 to 2 meters tall, with scabrous sheaths, flat blades, and open panicles 10 to 20 cm. long, the slender spreading branches naked below.

Dry thickets, Colombia and Ecuador. Originally described from Quito. (*Bonpland.*)

ECUADOR: Huigra, *Hitchcock* 20746. Quito, *Sodiro.*

9. Festuca quadridentata H. B. K. Nov. Gen. & Sp. **1**: 154. 1816.

A tall stout perennial, with culms 2 to 3 meters tall, flat blades, and large open panicles 30 to 50 cm. long, the spreading branches naked below.

Ecuador. Originally described from Guamote, between Riobamba and Alausí. (*Bonpland.*)

ECUADOR: Tungurahua, *Sodiro* in 1901.

10. Festuca compressifolia Presl, Rel. Haenk. **1**: 259. 1830.

Festuca fibrifera Pilger, Bot. Jahrb. Engler **37**: 509. 1906. (*Weberbauer* 2462.)

An erect cespitose perennial 50 to 100 cm. tall, with firm involute scabrous blades and open panicles 10 to 20 cm. long, the branches spreading, naked below.

Rocky slopes, Peru. Originally described from Huánuco. (*Haenke.*)

PERU: Chinche, *Macbride & Featherstone* 1282. Goyllarisquisca, *Hitchcock* 22313. Oroya, *Hitchcock* 22173; *Macbride & Featherstone* 949. Matucana. *Macbride & Featherstone* 334. Mito, *Macbride & Featherstone* 1695; *Macbride* 3258, 3317. Tarma, *Macbride & Featherstone* 1066; *Weberbauer* 2462. Huánuco, *Haenke* (fragment from type at German University at Prague).

11. Festuca procera H. B. K. Nov. Gen. & Sp. **1**: 154. 1816.

Festuca fiebrigii Pilger, Bot. Jahrb. Engler **37**: 510. 1906. (*Fiebrig* 3117.)

A slender perennial 1 to 2 meters tall, with flat blades and open panicles 10 to 30 cm. long.

Wooded slopes, Colombia to Bolivia. Originally described from near Quito. (*Bonpland.*)

ECUADOR: La Rinconada Ranch, *Hitchcock* 20798. Mount Pichincha, *Karsten; Sodiro* 282. Tulcán, *Hitchcock* 21094. Quito, *Harteman* 39; *Mille* 281, 286, *Sodiro.* Baños, *Hitchcock* 21926; *Sodiro.* El Altar, *Sodiro.* Between San Lucas and Oña, *Hitchcock* 21512. Riobamba, *Sodiro* in 1891. Tungurahua, *Spruce* 5938.

BOLIVIA: Tarija, *Fiebrig* 3117, 3118.

12. Festuca sublimis Pilger, Bot. Jahrb. Engler **25:** 718. 1898.

An erect cespitose perennial as much as 1 meter tall, with involute glabrous blades and open panicles 15 to 25 cm. long.

Alpine slopes, Ecuador, whence originally described, to Bolivia. (Type, *Stübel* 297.)

ECUADOR: Mount Pichincha. *Sodiro; Mille* 283, 285; *Jameson* 191 (Kew Herb.); *Harteman* 7a. Riobamba, *Sodiro.* Pucará de Chisalo, *Stübel* 297. Mount Altar, *Sodiro* in 1890. Between Cuenca and Huigra, *Hitchcock* 21682.

PERU: Paucartambo, *Weberbauer* 6922 (Field Mus.).

BOLIVIA: Ingenio del Oro, *Rusby* 204. Near Yungas, *Rusby* 44. Sorata, *Mandon* 1362. Rinconado, *Asplund* 6534. Pongo, *Hitchcock* 22775.

The Ecuador specimens are awnless; the Bolivia specimens awned or awn-pointed. The latter are somewhat diverse among themselves, and until more material is at hand they are referred rather doubtfully to *F. sublimis.* Though the blades, especially of the Bolivia specimens, are in the main involute, some of them may be only loosely so or even flat.

13. Festuca casapaltensis J. Ball, Journ. Linn. Soc. Bot. **22:** 62. 1885.

Bromus weberbaueri Pilger, Bot. Jahrb. Engler **37:** 517. 1906. (*Weberbauer* 2814.)

A dwarf perennial growing in dense tussocks as much as 10 cm. in diameter, with slender culms 10 to 15 cm. long, bearing a single leaf below the middle, numerous involute arcuate basal blades 1 to 2 cm. long, and small open few-flowered panicles 2 to 3 cm. long, the branches with age becoming recurved-spreading and the culm somewhat spiral.

Dry subalpine slopes, Peru. Originally described from Casapalta. (*Ball.*)

PERU: Cerro de Pasco, *Hitchcock* 22227, Baños, *Wilkes Expl. Exped.* Ocros, *Weberbauer* 2814. *Casapalta*, at 4.200 to 4,290 meters, *Ball* in 1882. (Kew Herb.).

14. Festuca parvipaniculata Hitchc., sp. nov.

A cespitose perennial; culms erect, glabrous, 15 to 30 cm. tall; sheaths glabrous; ligule less than 1 mm. long; blades involute, glabrous, mostly less than 10 cm. long, sometimes as much as 15 cm. long, one blade at or below the middle of the culm, 1 to 5 cm. long; panicle narrow, few-flowered, 3 to 5 cm. long, the branches ascending or appressed, the lower 1 to 3 cm. long, naked below; spikelets mostly 3-flowered; glumes somewhat unequal, the first acuminate, 1-nerved, about 5 mm. long, the second acute, 3-nerved, about 7 mm. long; lemmas obscurely nerved, scaberulous, about 7 mm. long, tapering into an awn 2 to 3 mm. long; rachilla scaberulous.

Type in the U. S. National Herbarium, no. 1,164,489, collected on slope of a railroad cut through a dry hill, Cerro de Pasco, Department of Junin, Peru. altitude 4,200 meters, November 1, 1923, by A. S. Hitchcock (no. 22244).

Dry hills at high altitudes, Peru.

PERU: Cerro de Pasco, *Hitchcock* 22244, 22245. Hacienda Atocsaico, *Hitchcock* 22193.

This species has somewhat the aspect of *F. casapaltensis*, from which it differs in the straight rather than S-shaped panicle branches, the entire rather than toothed lemma, and the acute rather than awn-pointed glumes. The panicle is not deciduous.

15. Festuca breviaristata Pilger, Bot. Jahrb. Engler **25**: 717. 1898.

An erect glabrous cespitose perennial 30 to 50 cm. tall, with firm involute blades much shorter than the culm crowded toward the base and one 1 to 2 cm. long, at about the middle of the culm, and narrow spikelike panicles 5 to 15 cm. long.

Paramos, Ecuador, whence originally described, and Bolivia. (Type, *Stübel* 207.)

ECUADOR: Mount Pichincha, *Lehmann* 495; *Hitchcock* 21058. Mount Chimborazo, *Hitchcock* 22019; *Sodiro*. Mount Puntas, *Stübel* 207.

16. Festuca andicola H. B. K. Nov. Gen. & Sp. **1**: 153. 1816.

A low cespitose perennial 10 to 20 cm. tall, with firm, folded or involute, glabrous blades mostly less than 5 cm. long, the single culm blade below the middle 1 to 2 cm. long; panicles narrow, few-flowered, about 5 cm. long, the branches appressed.

Paramos, Ecuador. Originally described from near Tulcán. (*Bonpland.*)

ECUADOR: Mount Chimborazo, *Hitchcock* 21981.

17. Festuca rigescens (Presl) Kunth, Rév. Gram. **1**: Suppl. XXXI. 1830.

Diplachne rigescens Presl, Rel. Haenk. **1**: 260. 1830.

Diplachne brevifolia Presl, Rel. Haenk. **1**: 261. 1830. (Huánuco, Peru.)

Festuca haenkei Kunth, Rév. Gram **1**: Suppl. XXXII. 1830.

Festuca humilior Nees & Mey. Nov. Act. Acad. Caes. Leop. Carol. **19**: Suppl. **1**: 35. 1841; 167. 1843. (Mountains of Peru.)

Festuca dissitiflora Steud.; Griseb. Abh. Ges. Wiss. Göttingen **24**: 287. 1879. (*Lechler* 1829.)

Festuca stuebelii Pilger, Bot. Jahrb. Engler **25**: 717. 1898. (*Stübel* 60.)

An erect cespitose perennial 20 to 40 cm. tall, with stiff glabrous involute blades, and narrow, pale, rather few-flowered panicles 5 to 10 cm. long; spikelets mostly 3 or 4-flowered; lemmas somewhat indurate, nerveless, rather turgid.

Dry plains and hills, Peru and Bolivia. Originally described from Huánuco, Peru. (*Haenke.*)

PERU: Cerro de Pasco, *Hitchcock* 22232, 22234, 22235, 22239, 22252. Hacienda Atocsaico, *Hitchcock* 22191, 22197; *McKenzie* in 1924. Obrajillo, *Wilkes Expl. Exped.;* Mountains of Huánuco, *Haenke*. Juliaca, *Harlan* in 1914. La Quinhua, *Hitchcock* 22282. Macusani, *Lechler* 1829 (Kew Herb.). San José, *Macbride & Featherstone* 1112. Oroya, *Macbride & Featherstone* 981; *Hitchcock* 22179. Goyllarisquisca, *Hitchcock* 22300. Cuzco, *Hitchcock* 22453. Chasqui, *Macbride & Featherstone* 2461.

BOLIVIA: Yungas, *Bang* 173. La Paz, *Holway* 483, 491, 604; *Stübel* 60; *Bang* 173 (a specimen under same number from Yungas). Palca, *Hitchcock* 22560. Chacaltaya, *Buchtien* 1191. Comanche, *Asplund* 6537, 6538, 6578. Isla del Sol, *Asplund* 6536. South of Atocha, *Hitchcock* 22930.

18. Festuca orthophylla Pilger, Bot. Jahrb. Engler **25**: 717. 1898.

Festuca orthophylla var. *glabrescens* Pilger, Bot. Jahrb. Engler **37**: 507. 1906. (Pucará, *Weberbauer* 408.)

Festuca orthophylla var. *boliviana* Pilger, Bot. Jahrb. Engler **37**: 508. 1906. (*Fiebrig* 3192.)

An erect cespitose perennial 30 to 50 cm. tall, with firm involute glabrous blades often as long as the culms, and narrow panicles 10 to 15 cm. long, the branches ascending; lemmas pubescent along the margins.

Dry hills and plains, Peru and Bolivia. Originally described from Arequipa. (Type, *Stübel* 87.)

PERU: Cuzco, *Hitchcock* 22455. Between Arequipa and Puno, *Weberbauer* 4842. Arequipa, *Stübel* 87. Chivay, *Weberhauer* 6892 (Field Mus.). Sumbay, *Weberbauer* 6897 (Field Mus.).

BOLIVIA: Puna Patanca, southern Bolivia, *Fiebrig* 3192. Pasña, *Buchtien* 1186. Cochabamba, *Hitchcock* 22786. South of Oruro, *Hitchcock* 22871. Chuguana, *Asplund* 6531.

19. Festuca glyceriantha Pilger, Bot. Jahrb. Engler **37**: 516. 1906.

About 1 meter tall; blades folded, firm, smooth; panicle narrow, 20 to 25 cm. long, the main branches appressed, few-flowered, the spikelets appressed to the main rachis, 12 to 14 mm. long.

Known only from the type collection.

PERU: Yungay, *Weberbauer* 3275.

20. Festuca dolichophylla Presl, Rel. Haenk. 1: 258. 1830.

Poa dactyloides H. B. K. Nov. Gen. & Sp. 1: 163. 1816. Not *Festuca dactyloides* Sibth. & Smith, 1806. (Antisana, Ecuador, *Bonpland.*)

Diplachne scirpifolia Presl, Rel. Haenk. 1: 261. 1830.

Festuca scirpifolia Kunth, Rév. Gram. 1: Suppl. XXXI. 1830.

Festuca subulifolia Benth. Pl. Hartw. 262. 1847. (Hacienda de Antisana.)

Festuca setifolia Steud.; Griseb. Abh. Ges. Wiss. Göttingen **19**: 251. 1874.[16] (*Lechler* 1826, from Peru.)

Festuca lasiorachis Pilger, Bot. Jahrb. Engler **37**: 508. 1906. (Cuyo-cuyo *Weberbauer* 904 and 907; Sandía, *Weberbauer* 589.)

Festuca laetiviridis Pilger, Bot. Jahrb. Engler **37**: 510. 1906. (*Fiebrig* 2955.)

Festuca carazana Pilger, Bot. Jahrb. Engler **37**: 511. 1906. (*Weberbauer* 3106.)

Festuca distichovaginata Pilger, Bot. Jahrb. Engler **37**: 511. 1906. (*Weberbauer* 3317.)

Festuca weberbaueri var. *foliosa* Pilger. Bot. Jahrb. Engler **37**: 513. 1906. (*Weberbauer* 4872.)

Festuca horridula Pilger, Bot. Jahrb. Engler **37**: 514. 1906. (*Weberbauer* 2586.)

Festuca tarmensis Pilger, Bot. Jahrb. Engler **37**: 515. 1906. (*Weberbauer* 2233.)

Festuca inarticulata Pilger, Bot. Jahrb. Engler **37**: 516. 1906. (*Weberbauer* 3218.)

Festuca buchtienii Hack. Repert. Nov. Sp. Fedde **6**: 160. 1908. (*Buchtien* 870.)

Festuca pflanzii Pilger, Bot. Jahrb. Engler **49**: 188. 1912. (*Pflanz* 292.)

An erect cespitose perennial 40 to 100 cm. tall, with slender, involute, glabrous or scabrous blades and narrow panicles 5 to 15 cm. long, the branches ascending or appressed; lemmas awnless or mucronate, rarely short-awned.

Paramos, Ecuador to Bolivia. Originally described from Huánuco, Peru. (*Haenke.*)

ECUADOR: Mount Pichincha, *Sodiro; Spruce* 5509. Mount Guanamí, *Mille* 284. Mount Atacatzo, *Harteman* 67. Mount Chimborazo, *Hitchcock* 21944, 21951, 21978, 21994, 22030.

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[16] Also in Lechler, Berb. Amer. Austr. 56. 1857, name only.

PERU: Mito, *Macbride* 3362. Caraz, *Weberbauer* 3106, 3218. Monzón, Dept. Huánuco, *Weberbauer* 3317. Tambo de Vaca, *Macbride* 4904. Oroya, *Macbride & Featherstone* 950; *Weberbauer* 2586. Hualgayoc, Dept. Cajamarca, *Weberbauer* 3974. Obrajillo, *Wilkes Expl. Exped.* Carumas, *Weberbauer* 7346. Huánuco, *Macbride & Featherstone* 2172. Goyllarisquisca, *Hitchcock* 22328. La Quinhua, *Hitchcock* 22270, 22276, 22281. Tarma, *Weberbauer* 2233. Río Blanco, *Macbride & Featherstone* 649. Torontoy, *Bingham* 728. Cuyo-cuyo, *Weberbauer* 907. Huánuco, *Haenke* (fragments of *F. dolichophylla* and *Diplachne scirpifolia* at the German University, Prague).

BOLIVIA: La Paz, *Holway* 460, 473, 477; *Hitchcock* 22568; *Buchtien* 870, 2546, 3131, 3966, 3967, 4486, 4488; *Rusby* 50; *Bang* 33; *Asplund* 6533. Sorata, *Mandon* 1361; *Rusby* 224; *Holway* 519. Pongo, *Hitchcock* 22778. Chalapata, *Asplund* 6530. Cochabamba, *Holway* 346. Cerro Sipascoya, *Herzog* 2052. Tupiza, *Fiebrig* 2955.

The specimens here assigned to *F. dolichophylla* may belong to more than one species. The types of Pilger's species, of most of which we have seen but fragments kindly sent by Doctor Pilger, show slight differences, but it is impossible to sort the above-cited specimens into these species and distinguish them by definite characters.

10. APHANELYTRUM Hack.

Spikelets 2 or 3-flowered, the rachilla joints capillary, flexuous, from half to three-fourths as long as the erect or spreading florets, prolonged beyond the uppermost floret; glumes minute.

1. **Aphanelytrum procumbens** Hack. Oesterr. Bot. Zeitschr. **52**: 13. 1902.
   Aphanelytrum decumbens Hack.; Sodiro, Anal. Univ. Quito 7. 1889, name only.
   Brachyelytrum procumbens Hack. in Engl. & Prantl, Pflanzenfam. 2^2: Nachtr. 42. 1897.

A weak decumbent branching straggling grass, apparently a perennial, with culms 40 to 80 cm. long, flat blades, and loose panicles 10 to 20 cm. long, the distant branches slender, bearing 1 or 2 spikelets at the extremities.

Moist banks, Colombia to Bolivia. Originally described from the mountains of Ecuador. (*Sodiro*, without exact locality.)

ECUADOR: Mount Pichincha, *Jameson* 168 (Kew Herb.), 269. Nono, *Sodiro*; *Holmgren* 649.

BOLIVIA: Unduavi, *Buchtien* 4268. Bella Vista, *Hitchcock* 22756.

The type specimen in the Hackel Herbarium is labeled "Ecuador, in silvis opac. 2000 m., leg. A. Sodiro." The specimen in the Sodiro Herbarium at Quito, presumably of the type collection, is from Nono, near Quito.

11. PUCCINELLIA Parl.

Spikelets several-flowered, differing from those of *Poa* chiefly in the rounded, scarcely compressed, obtuse or acutish, obscurely nerved lemmas, the nerves not approaching at the apex, glabrous or puberulent at the base only.

Second glume about 1 mm. long; lemmas about 1.5 mm. long____1. **P. parvula.**
Second glume 1.5 to 2 mm. long; lemmas about 2.5 mm. long____2. **P. oresigena.**

1. **Puccinellia parvula** Hitchc., sp. nov.

A pale, dwarf, densely cespitose, glabrous perennial, forming small tussocks 5 to 10 cm. in diameter; culms mostly less than 10 cm. tall; ligule truncate, about 1 mm. long; blades of the culm leaves flat or loosely involute, those of the innovations slender or capillary, involute, mostly less than 3 cm. long; panicles narrow, congested, 2 to 4 cm. long, more or less inclosed in the uppermost inflated sheath; spikelets 2 or 3-flowered, about 2 mm. long, the pedicels

about 0.5 mm. long; first glume ovate, acutish, 0.5 mm. long; second glume oval or somewhat obovate, obtuse, 1 mm. long; lemmas oblong or elliptic, a little more than 1 mm. long, obtuse, lacerate or somewhat toothed at apex, the upper third whitish, the marginal nerves distinct, the intermediate nerves faint; palea about as long as the lemma.

Type in the U. S. National Herbarium, no. 1,164,915, collected in moist gravelly river bed at Atocha, Sur-Chichas, southern Bolivia, altitude about 3,500 meters, January 9, 1924, by A. S. Hitchcock (no. 22878).

This species is distinguished by its small spikelets and florets. No specimens besides the type collection have been seen.

2. Puccinellia oresigena (Phil.) Hitchc.

Poa oresigena Phil. Anal. Mus. Nac. Chile Bot. 8: 87. 1891.

A spreading glabrous perennial, with decumbent culms 10 to 20 cm. long, decurrent ligules 3 to 4 mm. long, flat or loosely involute blades, and narrow, rather dense panicles as much as 10 cm. long; spikelets mostly about 3-flowered, 4 to 5 mm. long; first glume ovate, more or less notched at the obtuse apex, about 1 mm. long; second glume obtuse, about 2 mm. long; lemmas acutish, about 2.5 mm. long.

Moist soil, southern Bolivia and northern Chile, whence originally described.

BOLIVIA: Moist gravelly river bed, Atocha, *Hitchcock* 22879. Oruro, *Asplund* 6474.

12. POA L. BLUEGRASS

Spikelets small, few-flowered; glumes keeled, acute; lemmas herbaceous with scarious tips, keeled, 5-nerved, awnless.

Panicles narrow, more or less condensed, the branches short, floriferous to the base or nearly so. (Branches naked below but appressed in *P. brevis*.)
Plants dioecious. Pistillate lemmas villous; staminate lemmas glabrous.
1. P. buchtienii.
Plants hermaphrodite.
Lemmas pubescent on the keel and lateral nerves.
Lemmas about 2 mm. long; plants annual——**2. P. scaberula.**
Lemmas 3 to 4 mm. long; plants perennial——**3. P. subspicata.**
Lemmas glabrous or scabrous.
Plants dwarf, the relatively stout naked culms not more than 5 cm. tall, with a capitate panicle of few to several spikelets.
Lemmas firm, not lacerate; spikelets 2-flowered——**4. P. chamaeclinos.**
Lemmas rather thin, obtuse, and lacerate; spikelets 3 to 4-flowered.
5. P. humillima.
Plants 10 cm. or more tall (if dwarf the culm leafy and the panicle oblong and at least 15 mm. long).
Panicle slender, loosely flowered. Spikelets elliptic, 2-flowered (the lemma tips approaching), culms 7 to 12 cm. tall——**6. P. brevis.**
Panicles compact.
Spikelets about 8-flowered. First glume narrow, acute.
7. P. remota.
Spikelets about 3 or 4-flowered.
Lemmas acuminate, thin and whitish, somewhat shining, scabrous all over——**8. P. vaginalis.**
Lemmas acutish, broad, usually bronze-tinted, glabrous or somewhat scabrous——**9. P. gymnantha.**

Panicles more or less open, the branches spreading, the lower naked at base. (Branches appressed in *P. nigriflora*.)
Panicles very loose, more than 30 cm. long, with long distant capillary branches spikelet-bearing toward the ends. Sheaths retrorsely scabrous. **10. P. myriantha.**
Panicles not so loose nor so large (sometimes nearly so in *P. horridula*).
Lemmas glabrous or scabrous.
Branches of panicle appressed. Lemmas scabrous on upper part. **11. P. nigriflora.**
Branches of panicle spreading.
Lemmas scabrous. Glumes much shorter than the first lemma. **12. P. carazensis.**
Lemmas smooth or nearly so.
Creeping rhizomes present; sheaths smooth; lowermost sheaths finally fibrous---------- **13. P. fibrifera.**
Creeping rhizomes wanting; sheaths scabrous; lowermost sheaths not becoming fibrous.
First lemma 5 to 6 mm. long---------- **14. P. gilgiana.**
First lemma 3 to 4 mm. long.
Lower branches of panicle reflexed, naked below. **15. P. pardoana.**
Lower branches of panicle short, some naked, some floriferous to base---------- **16. P. lilloi.**
Lemma pubescent on back or nerves or with a few long fine-tangled hairs at base (cobweb).
Cobweb present.
Sheaths scabrous. Culms decumbent and creeping at base. **17. P. trivialis.**
Sheaths glabrous.
Culms lax and decumbent. Spikelet 2-flowered. **18. P. aequatoriensis.**
Culms erect.
Spikelets mostly 2-flowered; lower branches of panicle mostly solitary or in pairs---------- **19. P. cucullata.**
Spikelets 3 to 6-flowered; lower branches of panicle mostly in fours or fives.
Creeping rhizomes present---------- **20. P. pratensis.**
Creeping rhizomes wanting---------- **21. P. leioclada.**
Cobweb wanting.
Blades involute, scabrous---------- **22. P. asperiflora.**
Blades flat or folded.
Plants annual. Blades flat; panicle pyramidal, open, mostly not more than 5 cm. long---------- **23. P. annua.**
Plants perennial.
First glume 1 to 1.5 mm. long, the second often toothed. **24. P. denticulata.**
First glume about 3 mm. long.
Panicle mostly 15 to 30 cm. long---------- **25. P. horridula.**
Panicle mostly 5 to 10 cm. long---------- **26. P. candamoana.**

1. Poa buchtienii Hack. Repert. Nov. Sp. Fedde **11**: 29. 1912.
Poa buchtienii var. *subacuminata* Hack. Repert. Nov. Sp. Fedde **11**: 30. 1912.
(***Buchtien* 2523.**)

An erect cespitose dioecious perennial 50 to 80 cm. tall, with slender, elongate, flat, or loosely involute blades and condensed, interrupted, or lobed panicles 8 to 15 cm. long; pistillate spikelets densely pilose, the staminate glabrous.

Dry shaded banks, Bolivia, whence originally described, the specimens cited being *Buchtien* 2467, 2468, 2469, 2470, 2466, the first four staminate, the last pistillate.

BOLIVIA: Sorata, *Rusby* 223; *Mandon* 1338 (Kew Herb.). La Paz, *Buchtien* 869, 2466, 2467, 2468, 2469, 2470; *Hitchcock* 22559, 22567, 22570, 22571. Palca, *Buchtien* 2523. Challapata, *Asplund* 6479.

2. Poa scaberula Hook. f. Fl. Antarct. 378. 1847.

Dasypoa tenuis Pilger, Bot. Jahrb. Engler **25**: 716. 1898. Not *Poa tenuis* Ell. 1816. (*Stübel* 60f.)

An erect cespitose annual 20 to 50 cm. tall, with lax slender flat blades and condensed narrow panicles 3 to 15 cm. long, the branches appressed, more or less imbricate, 1 to 2.5 cm. long, densely flowered to base.

Grassy slopes, Peru to Argentina. Originally described from Straits of Magellan.

PERU: Oroya, *Hitchcock* 22186. Ollantaytambo, *Hitchcock* 22540. Lake Titicaca, *Stübel* 60f.

BOLIVIA: Sorata, *Mandon* 1336. La Paz, *Buchtien* 2496. San Felipe, *Hitchcock* 22598. Pongo, *Hitchcock* 22761; *Asplund* 6466. Cochabamba, *Hitchcock* 22859, 22860, 22865. Tarija, *Fiebrig* 2936. Challapata. *Asplund* 6478.

3. Poa subspicata (Presl) Kunth, Rév. Gram. 1: Suppl. XXVIII. 1830.

Brizopyrum subspicatum Presl, Rel. Haenk. **1**: 281. 1830.

Poa pubiflora Benth. Pl. Hartw. 261. 1847. (Hacienda Antisana, Ecuador. *Hartweg* 1451.)

Poa jelskii Hack. Oesterr. Bot. Zeitschr. **52**: 454. 1902. (*Jelski* 392.)

A cespitose perennial 20 to 30 cm. tall, with flat, rather lax blades 10 cm. long and 2 mm. wide, and narrow dense spikelike panicles 6 to 9 cm. long.

Paramos and alpine slopes, Ecuador and Peru, whence originally described. (*Haenke.*)

ECUADOR: Chillo, *Sodiro* in 1890. Mount Chimborazo, *Hitchcock* 21999½, 22026. Antisana, *Anthony & Tate* 279. Riobamba, *Mille.*

PERU: Cutervo, *Jelski* 392. Hacienda Atocsaico, *Hitchcock* 22195, 22201.

4. Poa chamaeclinos Pilger, Bot. Jahrb. Engler **37**: 379. 1906.

A dwarf cespitose perennial a few centimeters tall, with short firm involute blades and few-flowered panicles about 1 cm. long, scarcely exceeding the leaves; spikelets 2-flowered, the lemmas firm, acute.

Alpine slopes, Peru. Known only from the type collection.

PERU: Andes above Lima, alt. 4,500 meters, *Weberbauer* 5118.

5. Poa humillima Pilger, Bot. Jahrb. Engler **37**: 378. 1906.

A dwarf cespitose perennial 2 to 3 cm. tall, resembling *P. chamaeclinos*, differing in the 3 or 4-flowered spikelets and in the thinner obtuse lemmas.

Alpine slopes, Peru and Bolivia. Originally described from Peru. *Weberbauer* 2602 and 5113 (Andes above Lima) being cited.

PERU: Oroya, *Weberbauer* 2602. Casa Cancha, *Wilkes Expl. Exped.*

BOLIVIA: Sorata, *Mandon* 1353. Chacaltaya, *Buchtien* 1201. Potosí, *D'Orbigny* 194.

6. Poa brevis Hitchc., sp. nov.

A low, lax perennial; culms cespitose, erect or ascending, glabrous, 5 to 10 cm. tall; sheaths glabrous; ligule rounded, about 0.5 mm. long; blades flat, lax, as much as 1 mm. wide on the culm, slender, folded, as much as 6 cm.

long on the innovations, the tip boat-shaped; panicles narrow, few-flowered, 2 to 3 cm. long, the branches appressed, the lower as much as 2 cm. long, bearing 2 or 3 spikelets, the axis and branches glabrous; spikelets 2-flowered, about 3 mm. long; glumes nearly equal, broad, acutish, glabrous, 3-nerved, about 2 mm. long; lemmas glabrous, the two nearly the same height, the second smaller, the first 2.5 mm. long, acutish, very minutely scabrous on the keel, the intermediate nerves obsolete; palea nearly as long as the lemma, the rachilla extended beyond the base of the upper floret about 0.3 mm.

Type in the herbarium of the Field Museum, no. 535441, collected on wet, mossy, rocky, open upland at Tambo de Vaca, Peru, altitude 4,000 meters, June 10 to 24, 1923, by J. Francis Macbride (no. 4356).

No specimens other than the type collection have been seen. In the spikelet character this species resembles *P. chamaeclinos* Pilger, but the blades are lax and flat instead of involute, and the glumes are broad, equal, and shorter than the two florets, while in the other species they are unequal, narrower, and nearly as long as the spikelet.

7. Poa remota H. B. K. Nov. Gen. & Sp. 1: 163. 1816.

An erect perennial 60 to 100 cm. tall, with flat blades and erect narrow panicles 10 to 15 cm. long; spikelets oblong, about 8-flowered; first glume 2.5 mm., the second 3.5 mm. long; lemmas 6 mm. long, glabrous, acuminate but not awned, rounded on the back below, keeled toward the scaberulous tip; palea as long as the lemma.

Described from high plains near Latacunga, Ecuador. (*Bonpland.*)

I have been unable to place this species with any other collections seen. Doctor Lecomte kindly sent me a spikelet from the type specimen at Paris. It appears to belong to *Festuca* rather than to Poa. Rather than make a new name, the species is retained in *Poa* until it is better known.

8. Poa vaginalis Benth. Pl. Hartw. 261. 1848.

A glabrous erect cespitose perennial 30 to 50 cm. tall, with short, folded, rather firm, falcate blades, and narrow whitish panicles about 10 cm. long; spikelets about 3-flowered, the rachilla scabrous; first glume narrow, acute, 7 mm. long; second glume broader, rather obtuse, 8 mm. long; lemmas acuminate, finely scabrous all over, 7 to 8 mm. long.

Known only from the type collection, from Hacienda de Antisana. *Hartweg* 1450.

Doctor Hill, director of the herbarium at Kew, very kindly lent the type specimen for examination.

9. Poa gymnantha Pilger, Bot. Jahrb. Engler 56: Beibl. 123: 28. 1920.

An erect cespitose pale perennial, mostly 15 to 20 cm. tall, with firm erect glabrous involute blades, and narrow, rather condensed panicles 2 to 5 cm. long or rarely as much as 8 cm.

Alpine slopes, Peru and Bolivia. Originally described from Peru, *Weberbauer* 6905 and 5440 being cited.

PERU: Sumbay, *Weberbauer* 6905. Occa Pampa, *Shepard* 59.

BOLIVIA: Sorata, *Mandon* 1350, 1351. La Paz, *Buchtien* 6471. Rinconada, *Asplund* 6465. La Cumbre, *Asplund* 6495. La Paz, *Mandon* 1347. Comanche, *Asplund* 6488. Chacaltaya, *Buchtien* 1203.

10. Poa myriantha Hack.; Stuck. Anal. Mus. Nac. Buenos Aires 13: 517. 1906.

A tall slender perennial, with solitary, rather lax culms as much as 2 meters tall, scabrous sheaths, flat blades, and very loose, open panicles as much as 40 cm. long, the slender verticillate distant branches bearing spreading capillary branchlets with a few spikelets toward the ends.

Moist banks, Bolivia to Argentina. Originally described from Tucumán, Argentina.

BOLIVIA: Sorata, *Mandon* 1342 (Kew Herb.). Bella Vista, *Hitchcock* 22759. Tablas, *Herzog* 2182.

11. Poa nigriflora Hitchc., sp. nov.

A densely cespitose perennial; culms firm, glabrous, erect, 50 to 60 cm. tall; sheaths glabrous; ligule truncate, about 1 mm. long, minutely ciliolate; blades firm and hard, 10 to 15 cm. long, involute, glabrous, somewhat curved or falcate, ending in a hard blunt point, about 1 mm. thick when rolled, the uppermost at or below the middle of the culm, 5 to 10 cm. long; panicles narrow, strict, 10 to 12 cm. long, the branches ascending or appressed, the longer ones as much as 5 cm. long, naked at base, somewhat imbricate but loosely flowered, the axis and branchlets glabrous or the latter scabrous on one angle; spikelets appressed to the branchlets, 5 to 8 mm. long, mostly 2 or 3-flowered; glumes greenish, the first narrow, 2.5 mm. long, the blunt point ciliolate, the second oblong, 3.5 mm. long, 3-nerved, scabrous on the keel, the obtuse apex ciliolate; lemmas glabrous on the lower half, scabrous above, firm, obscurely nerved, not much compressed, dark brown or almost black, with rufous tips, the lowermost about 5 mm. long, the rachilla glabrous; palea narrow, a little longer than the lemma, glabrous below and scabrous above like the lemma.

Type in the U. S. National Herbarium, no. 1,161,474, collected on rocky lake shore, forming tough clumps, at an altitude of 4,200 meters, at Huarón, Peru, June 12, 1922, by Macbride & Featherstone (no. 1135).

This species is recognized by its firm foliage and strict dark-colored panicles. No other specimens than those of the type collection have been seen.

12. Poa carazensis Pilger, Bot. Jahrb. Engler **37**: 380. 1906.

An erect cespitose perennial 30 cm. tall, with flat, mostly basal blades and open panicles about 4 cm. long.

Alpine slopes, Peru. Known only from the type collection.

PERU: Caraz, *Weberbauer* 3073.

13. Poa fibrifera Pilger, Bot. Jahrb. Engler **37**: 380. 1906.

A lax perennial, with fiber-covered base, flat blades, and narrow open panicle about 8 cm. long, the branches naked below, ascending.

Alpine slopes, Peru. (Type, *Weberbauer* 2662.)

PERU: Ocros, *Weberbauer* 2662. Matucana, *Macbride & Featherstone* 367, 440. Baños, *Wilkes Expl. Exped.* Oroya, *Hitchcock* 22176. Tambo de Vaca, *Macbride* 4354, 4365. Mito, *Macbride* 3363.

14. Poa gilgiana Pilger, Bot. Jahrb. Engler **37**: 507. 1906.

An erect cespitose perennial about 80 cm. tall, with firm flat blades folded below, and open panicles 15 to 18 cm. long.

Alpine slopes, Peru. Known only from the type collection.

PERU: Azángaro, *Weberbauer* 477.

15. Poa pardoana Pilger, Bot. Jahrb. Engler **37**: 379. 1906.

An erect, glabrous, rather loosely cespitose perennial, with erect, narrow, folded or involute blades, and loose, rather narrow, nodding panicles 10 to 20 cm. long, the slender branches mostly two, distant on the axis, finally reflexed, the axis glabrous, the branches scabrous.

Alpine slopes and paramos, Ecuador and Peru, whence originally described. (Type, *Weberbauer* 3975.)

ECUADOR: Tulcán, *Hitchcock* 20919. Mount Pichincha, *Hitchcock* 21083; *Hartcman* 76, 85; *Jameson* in 1859. Mount Chimborazo, *Hitchcock* 21948,

21986, 22004. Between Oña and Cuenca, *Hitchcock* 21630. Páramo de Atacatzo, *Holmgren* 598. Mount Azuay, *Spruce* 6098 (Kew Herb.).

PERU: Hualgayoc, *Weberbauer* 3975.

16. Poa lilloi Hack.; Stuck. Anal. Mus. Nac. Buenos Aires **21**: 153. 1911.

An erect cespitose perennial 20 to 30 cm. tall with folded or involute blades and open panicles 2 to 4 cm. long.

Dry hills, southern Bolivia and northern Argentina. Originally described from Tucumán, Argentina.

BOLIVIA: Atocha, *Hitchcock* 22931.

17. Poa trivialis L. Sp. Pl. 67. 1753.

Poa trachyphylla Hack. Oesterr. Bot. Zeitschr. **52**: 379. 1902. Not *P. trachyphylla* Pilger, 1898. (Pichincha, Ecuador, *Sodiro*.)

A lax, decumbent or spreading perennial, with somewhat roughened sheaths, flat blades, and open pyramidal panicles 3 to 8 cm. long.

Along streams and ditches, the decumbent sterile shoots and culms sometimes extending into the water and floating, temperate regions; introduced from Europe, whence originally described.

ECUADOR: Quito, *Harteman* 13.

PERU: La Quinhua, *Hitchcock* 22266, 22277, 22279.

Professor Hackel differentiates *P. trachyphylla* from *P. trivialis* chiefly on the development of branching stolons and the greater number of nodes of the culm. The type of *P. trachyphylla* Hack. has not been examined since it is not in the Hackel Herbarium. The specimens cited from La Quinhua grew near the water of mountain brooks and the decumbent sterile shoots extended into the water. Except for these stolons, the plants agree with *Poa trivialis*. Since the name given by Hackel is untenable, the plants are referred to *Poa trivialis* until more material is at hand.

18. Poa aequatoriensis Hack. Oesterr. Bot. Zeitschr. **52**: 450. 1902.

A lax decumbent perennial 40 to 80 cm. tall, with flat lax blades, and open nodding panicles 10 to 15 cm. long, the capillary branches naked below.

Moist banks, Ecuador, whence originally described. (*Sodiro*, without exact locality.)

ECUADOR: Subandean region, *Sodiro* in 1876. Mount Pichincha, *Sodiro* in 1888. Between San Lucas and Oña, *Hitchcock* 21557. Between La Toma and Loja, *Hitchcock* 21369. Huataxi, *Spruce* 6095 (Kew Herb.). Tungurahua, *Spruce* 5929 (Kew Herb.).

19. Poa cucullata Hack. Oesterr. Bot. Zeitschr. **52**: 377. 1902.

Poa depauperata H. B. K. Nov. Gen. & Sp. **1**: 162. 1816. Not *P. depauperata* Kit. 1813. (Near Quito.)

An erect, smooth, somewhat succulent, loosely cespitose perennial, with slender deep-creeping rhizomes, culms 20 to 40 cm. tall, folded obtuse blades 1 to 3 mm. wide (folded), and usually dark, nodding panicles 5 to 8 cm. long, the branches 1 to 2 cm. long, naked below, closely flowered or glomerate above.

Alpine slopes near snow line, Ecuador, whence described. (Mount Pichincha, *Sodiro*.)

ECUADOR: Mount Pichincha, *Sodiro* in 1885; *Mille* 277; *Harteman* 83; *Karsten; Jameson* in 1859; *Hitchcock* 21048; *Lehmann* 491a, 8025 (Kew Herb.). Mount Chimborazo, *Hitchcock* 21956, 21967, 21984, 22017; *Hans Meyer* 437. Mount Antisana, *Stübel* 230.

20. Poa pratensis L. Sp. Pl. 67. 1753.

Poa boliviensis Hack. Repert. Nov. Sp. Fedde **11**: 25. 1912. (*Buchtien* 2536.)

An erect perennial, with creeping rhizomes, glabrous culms 30 to 50 cm. tall, and open panicles 4 to 10 cm. long, the lower branches 3 to 5, spreading.

Commonly cultivated in temperate regions; originally from Europe; escaped in mountains of South America.

PERU: Tarma, *Hitchcock* 22171.

BOLIVIA: Palca, *Buchtien* 2536; *Hitchcock* 22572. La Paz, *Buchtien* 236.

21. Poa leioclada Hack. Oesterr. Bot. Zeitschr. **52**: 452. 1902.

A loosely cespitose perennial 30 to 50 cm. tall, with narrow, flat or loosely folded blades and ovate spreading panicles, the branches glabrous.

Grassy slopes, at 3,000 to 4,000 meters, Ecuador. Originally described from Mount Pichincha. The collector is not mentioned in the original description but the type specimen in the Hackel Herbarium was collected by *Sodiro*.

ECUADOR: Mount Pichincha, *Sodiro* in 1887. Panacillo, *Sodiro* in 1904.

22. Poa asperiflora Hack. Repert. Nov. Sp. Fedde **11**: 28. 1912.

Poa pflanzii Pilger, Bot. Jahrb. Engler **49**: 187. 1912. (*Pflanz* 266 and 360, both from Palca.)

An erect cespitose perennial 20 to 50 cm. tall, with involute scabrous erect blades and open nodding panicles, the slender branches finally reflexed, naked below.

Alpine slopes, Peru and Bolivia, whence originally described. (Type, *Buchtien* 2549.)

PERU: Viso, *Macbride & Featherstone* 629. Rio Blanco, *Macbride* 3001. Oroya, *Hitchcock* 22175.

BOLIVIA: Isla del Sol, *Buchtien* 2549. Sorata, *Mandon* 1341. Palca, *Pflanz* 360. Mount Illimani, near snow line, *Hitchcock* 22589. La Paz, *Bang* in 1890. Pilaya, *Hitchcock* 22587. Pongo, *Hitchcock* 22774. General Campero, *Asplund* 6529.

23. Poa annua L. Sp. Pl. 68. 1753.

Poa infirma H. B. K. Nov. Gen. & Sp. **1**: 158. 1816.

Poa aestivalis Presl, Rel. Haenk. **1**: 272. 1830. (Mountains of Peru, corrected in the Addenda to Monterey, Calif.)

Poa algida Trin. Linnaea **10**: 306. 1836. (Cerro de Pasco, Peru.)

Poa meyenii Nees & Mey. Nov. Act. Acad. Caes. Leop. Carol. **19**: Suppl. **1**: 31. 1841; 163. 1843. (Lake Titicaca.)

A low tufted soft smooth annual, the culms decumbent at base, the pale open panicles commonly about 5 cm. long.

Open and waste ground and grassland throughout the temperate regions of North America and extending southward in the mountains; introduced from Europe, whence originally described.

ECUADOR: Tulcán, *Hitchcock* 21036. Quito, *Arcade* 14; *Harteman* 45. Mount Chimborazo, *Hitchcock* 22011. Riobamba, *Spruce* 6096 (Kew Herb.). Luisa, *Rose* 22402, 23577, 23909. Cañar, *Rose* 22745.

PERU: Cerro de Pasco, *Hitchcock* 22248. Hacienda Atocsaico, *Hitchcock* 22190; *McKenzie* in 1924. Mito, *Macbride & Featherstone* 1712. Lima, *Hitchcock*, 22344; *Macbride* 5906. Cuzco, *Hitchcock* 22495½. Chuquibambilla, *Hitchcock* 22451. Juliaca, *Harlan* in 1914. Occa Pampa, *Shepard* 90. Arequipa, *Hitchcock* 22436.

BOLIVIA: La Paz, *Buchtien* 2464, 2465; *Rose* 18865, 18867; *Holway* 421. Palca, *Buchtien* 2534; *Hitchcock* 22574. Cochabamba, *Hitchcock* 22864. Hacienda Casana, *Buchtien* 7139. Comanche, *Asplund* 6501. Carabuco, *Buchtien* 6528.

24. Poa denticulata Hack. Repert. Nov. Sp. Fedde **11**: 27. 1912.

A loosely cespitose perennial, with creeping rhizomes, soft culms 15 to 20 cm. tall, flat blades 3 mm. wide, and open panicles 3 to 5 cm. long, the branches 2 to 5, spreading, naked below, few-flowered toward the ends.

Sunny slopes, Bolivia. Known only from the type collection.

BOLIVIA: Unduavi, *Buchtien* 2584.

25. **Poa horridula** Pilger, Bot. Jahrb. Engler **37**: 506. 1906.

Melica expansa Steud.; Lechl. Berb. Amer, Austr. 56. 1857, name only (*Lechler* 1734.)

Poa androgyna Hack. Repert. Nov. Sp. Fedde **6**: 159. 1908. (*Buchtien* 846.)

Poa dumetorum Hack. Repert. Nov. Sp. Fedde **11**: 26. 1912. (*Buchtien* 2582.)

Poa dumetorum var. *unduavensis* Hack. Repert. Nov. Sp. Fedde **11**: 27. 1912. (*Buchtien* 2583.)

An erect perennial, often growing in large clumps, with culms 1 to 1.5 meters tall, sometimes decumbent at base, flat blades as much as 8 mm. wide, and open oblong-pyramidal panicles 10 to 20 cm. long, the branches slender, verticillate, widely spreading, sometimes drooping or reflexed, naked below, the spikelets glomerate on the branches.

Moist banks and cliffs, Ecuador to Bolivia. Originally described from Peru. (Type, *Weberbauer* 3113.)

ECUADOR: Guaranda, *Jameson* 163 (Kew Herb.). Mount Guaminí, *Jameson* 694 (Kew Herb.).

PERU: Goyllarisquisca, *Hitchcock* 22302, 22316, 22322. La Quinhua, *Hitchcock* 22260, 22265, 22280. Cerro de Pasco, *Hitchcock* 22251. Río Blanco, *Macbride & Featherstone* 646, 707. Chavinillo, *Macbride & Featherstone* 1970. Obrajillo, *Wilkes Expl. Exped.* Cuzco, *Hitchcock* 22458, 22459, 22477, 22479, 22513. Chuquibambilla, *Hitchcock* 22443. Azángaro. *Lechler* 1734 (Kew Herb.). Macusani, *Lechler* 2682 (Kew Herb.). Tabina, *Lechler* 2058 (Kew Herb.).

BOLIVIA: Sorata, *Mandon* 1339. Bella Vista, *Hitchcock* 22754. Pongo, *Hitchcock* 22782. Unduavi, *Buchtien* 2582, 2583. La Paz, *Buchtien* 846, 2482; *Rusby* 13; *Holway* 496. Comanche, *Asplund* 6508. Challapata, *Asplund* 6473.

POA MULALENSIS H. B. K. Nov. Gen. & Sp. 1: 162. 1816. "Crescit in scopulosis, montanis Andium Quitensium prope Mulalo (1590 hexap.) et juxta nivis perpetuae limitem in monte ignivomum Cotopaxi, inter Pumaurcu et Suniguaicu, alt. 226 hexap." This species has not been identified. It may be the same as *P. horridula* Pilger. Doctor Lecomte informs me that the type can not be found in the Paris Herbarium.

26. **Poa candamoana** Pilger, Bot. Jahrb. Engler **37**: 381. 1906.

Differing from *P. horridula* in being smaller, with narrower blades, and smaller, less open panicles. May be a small form of that species.

Plains, grassy slopes and rocky cliffs. Peru and Bolivia. Originally described from Peru. (Type, *Weberbauer* 472.)

PERU: Goyllarisquisca *Hitchcock* 22288, 22289, 22335. Hacienda Atocsaico, *Hitchcock* 22196, 22212, 22213, 22216; *McKenzie* in 1924. Río Blanco, *Macbride* 2969. Oroya, *Hitchcock* 22188. Between Casa Cancha and Culnai, *Wilkes Expl. Exped.* Chicla, *Rose* 18683. Cuzco, *Hitchcock* 22469, 22501. Chuquibambilla, *Hitchcock* 22442. Juliaca, *Harlan* in 1914. Azángaro, *Weberbauer* 472. Carumas, *Weberbauer* 7310.

BOLIVIA: Near Yungas, *Rusby* 27. Pongo, *Hitchcock* 22765, 22769. La Paz, *Asplund* 6482; *Buchtien* 2472. Palca, *Buchtien* 2528, 2542.

POA ADUSTA Presl, Rel. Haenk. **1**: 271. 1830. "Hab. in Peruvia." This species has not been identified. In the herbarium of the German University at Prague, when the writer visited it, there was a cover marked *Poa adusta*, but there was no specimen within.

13. BRIZA L.

Spikelets several to many-flowered, the florets crowded, almost horizontal; glumes and lemmas broad, subchartaceous, the margins scarious; palea much smaller than its lemma.

Plants annual. Spikelets triangular-ovate, 4 to 5 mm. long, in a loose open panicle ..... **1. B. minor.**

Plants perennial.

Spikelets oblong or elliptic, 2 to 3 mm. long, in an open nodding panicle. **2. B. mandoniana.**

Spikelets nearly orbicular, 4 to 5 mm. wide, in a narrow rather strict panicle. **3. B. stricta.**

1. Briza minor L. Sp. Pl. 70. 1753.

A weak-stemmed annual 30 to 50 cm. tall, with thin flat scabrous blades and loosely flowered panicles, the branchlets subcapillary but stiffly spreading, the spikelets triangular-ovate, nodding.

Open ground, sparingly introduced in America. Originally described from Europe.

ECUADOR: Quito, *Harteman* 52; *Arcade* 3. Riobamba, *Mille* 274.

PERU: Lima, *Hitchcock* 22427.

2. Briza mandoniana (Griseb.) Henr. Med. Rijks Herb. Leiden **40**: 70. 1921.

Calotheca stricta var. *mandoniana* Griseb. Abh. Ges. Wiss. Göttingen **24**: 289. 1879.

Poa monandra Hack. Oesterr. Bot. Zeitschr. **52**: 376. 1902.

Briza lilloi Parodi, Univ. Nac. Buenos Aires, Rev. Agron. **3**: 133. *f.* 6^1, 7^1, 1920.

Briza mandoniana var. *tuberculata* Henr. Med. Rijks Herb. Leiden **40**: 71. 1921. (*Mandon* 1355 in part.)

Briza mandoniana var. *herzogiana* Henr. Med. Rijks Herb. Leiden **40**: 71. 1921. (*Herzog* 3017.)

Briza mandoniana var. *vallegrandensis* Henr. Med. Rijks Herb. Leiden **40**: 71. 1921. (Vallegrande, Bolivia, *Herzog* 1879.)

A slender delicate erect perennial 20 to 60 cm. tall, with flat, mostly basal blades, and loose nodding panicles 5 to 10 cm. long, the branches few, capillary, few-flowered, naked below; spikelets ovate, not very turgid, sometimes tuberculate, about 5 mm. long; aspect that of a species of *Poa*. The Huarón specimen (*Macbride & Featherstone* 1154) cited below differs in having condensed panicles and stouter culms.

Paramos, wooded slopes, and moist cliffs, Colombia to Argentina. Originally described from Bolivia. (Type, *Mandon* 1356.)

ECUADOR: Tulcán, *Hitchcock* 21041. Quito, *Harteman* 25, 42; *Mille* 276; *Holway* 953; *Sodiro; Jameson* 779 (Kew Herb.). Mount Chimborazo, *Hitchcock* 21948½. Baños, *Hitchcock* 21909. Between Oña and Cuenca, *Hitchcock* 21628, 21639. Between La Toma and Loja, *Hitchcock* 21384, 21430. Between San Lucas and Oña, *Hitchcock* 21531. Between Loja and San Lucas, *Hitchcock* 21462, 21487.

PERU: Huarón, *Macbride & Featherstone* 1154. Mito, *Macbride & Featherstone* 1433, 1728; *Macbride* 3316. Chachapoyas, *Mathews* 3237 (Kew Herb.).

BOLIVIA: Sorata, *Rusby* 238; *Mandon* 1355 (Kew Herb.), 1356. Pongo, *Hitchcock* 22773. Unduavi, *Buchtien* 4280. Choquetanga, *Herzog* 3017.

3. Briza stricta (Hook. & Arn.) Steud. Nom. Bot. ed. 2. **1**: 225. 1840.

Calotheca stricta Hook. & Arn. Bot. Beechey Voy. 50. 1841.

An erect slender cespitose perennial 40 to 80 cm. tall, with elongate slender blades and narrow, somewhat congested panicles, more or less interrupted,

especially below, the branches erect, few-flowered, the pedicels shorter than the ovoid spikelets, these about 5 mm. long.

Sandy fields and dry slopes, Bolivia, Argentina, and Chile. Originally described from Concepción, Chile.

BOLIVIA: Cochabamba, *Holway*, 383.

CHASCOLYTRUM SPICIGERUM, C. RUFUM, CALOTHECA MACROSTACHYA, C. RENIFORMIS, C. MICROSTACHYA, and PANICUM POAEMORPHUM are described by Presl as coming from the mountains of Peru (vicinity of Huánuco). Since these species, now referred to *Briza*, have not been collected in Peru by other botanists, it may be that, as in the case of several other species described by Presl, there is an error in the locality. They may have come from Chile, where Haenke made a collection. In the list of errata Presl gives the locality of *Calotheca macrostachya* as Monterey, Calif., but no such species is known from that State.

14. ERAGROSTIS Host

Spikelets few to many-flowered, strongly compressed; glumes and lemmas keeled, the lemmas 3-nerved; rachilla often continuous with the paleas persisting after the fall of the fruit.

Palea ciliate on the keels, the cilia usually as long as the width of the lemma.
  Plants annual.
    Panicle close and spikelike, more or less interrupted. (See also *E. peruviana*.) **1. E. ciliaris.**
    Panicle oblong or narrowly pyramidal, open.
      Axis and branches not viscid, the branches rather lax——**2. E. amabilis.**
      Axis and branches of panicle viscid, the branches stiffly spreading. **3. E. viscosa.**

Palea not conspicuously ciliate on the keels.
  Plants creeping, forming mats——**4. E. hypnoides.**
  Plants not creeping.
    Plants annual.
      Lemmas glandular on the keel, 1 mm. wide (as folded)——**5. E. cilianensis.**
      Lemmas not glandular, mostly less than 1 mm. wide (as folded).
        Panicle elongate (as much as 40 cm.), contracted, the minute spikelets crowded or glomerate——**6. E. glomerata.**
        Panicle not elongate and dense.
          Panicles oval or oblong, dense, 1 to 5 cm. long——**7. E. peruviana.**
          Panicles more or less open.
            Blades pilose.
              Spikelets sessile or nearly so; axils of branches conspicuously pilose; lemmas acuminate——**8. E. maypurensis.**
              Spikelets pediceled; axils glabrous or slightly pilose; lemmas acutish——**9. E. articulata.**
            Blades glabrous or pilose near base only.
              Panicles dark purple, the branches implicate at maturity. **10. E. nigricans.**
              Panicles green or lead color, not implicate.
                Spikelets about 1 mm. wide——**11. E. pilosa.**
                Spikelets nearly 2 mm. wide.
                  Panicles somewhat pilose in the axils——**12. E. mexicana.**
                  Panicles glabrous in the axils——**13. E. limbata.**
  Plants perennial.
    Panicles dense and spikelike.
      Panicles 3 to 6 cm. long, attenuate or interrupted below. **14. E. weberbaueri.**

Panicles elongate.
Panicles slender, about 3 mm. wide; blades less than 10 cm. long.
15. E. attenuata.
Panicles 1 cm. wide; blades as much as 1 meter long---16. E. tenax.
Panicles open or narrow but not dense and spikelike.
Panicles narrow, the branches appressed or ascending or, if spreading, short and closely flowered.
Branches of panicle somewhat distant, usually stiffly spreading or ascending, densely flowered, sometimes naked at base for as much as 1 cm., usually less than 5 cm. long----------17. E. lurida.
Branches of panicle ascending or appressed-------18. E. pastoensis.
Panicles open, sometimes diffuse.
Branches spreading, naked at base for 2 to 5 cm., rather closely flowered toward the end----------19. E. montufari.
Branches of panicle rather evenly flowered throughout.
Culms robust, as much as 1.5 meters tall and 6 mm. thick at base.
20. E. magna.
Culms comparatively low and slender, rarely as much as 1 meter tall.
Spikelets mostly more than 8-flowered.
Lemmas somewhat remote, only slightly overlapping the next one above, the keel nearly straight--------23. E. patula.
Lemmas closely imbricate, the keel curved.
Lemmas 1.5 mm. long, 0.5 mm. wide (as folded).
22. E. expansa.
Lemmas 2 mm. long, about 1 mm. wide (as folded).
21. E. bahiensis.
Spikelets mostly 3 to 5-flowered.
Rachilla conspicuously pilose----------24. E. pilgeriana.
Rachilla glabrous.
Lemmas 3 mm. long----------27. E. carazensis.
Lemmas about 2 mm. long.
Sheaths and blades more or less pilose or nearly glabrous.
25. E. lugens.
Sheaths and blades strongly hirsute----26. E. polytricha.

1. Eragrostis ciliaris (L.) Link, Hort. Berol. **1**: 192. 1827.

Poa ciliaris L. Syst. Nat. ed. 10. **2**: 875. 1759.

An erect to prostrate annual, with slender wiry culms 10 to 40 cm. tall, flat blades, and dense, narrow, interruptedly spikelike panicles 5 to 15 cm. long.

Waste places, at low altitudes, tropics of both hemispheres. Originally described from Jamaica.

ECUADOR: Oil Camp between Guayaquil and Salinas, *Hitchcock* 20015. Milagro, *Hitchcock* 20176. Chanduy, *Spruce* 6431a, 6433 (both Kew Herb.).

PERU: Lima, *Wilkes Expl. Exped.* Colonia Perené, *Hitchcock* 22074. Piura, *Spruce* 6431b (Kew Herb.).

BOLIVIA: Huachi, *White* 915 (Kew Herb.).

2. Eragrostis amabilis (L.) Wight & Arn.; Hook. & Arn. Bot. Beechey Voy. 251. 1841.

Poa amabilis L. Sp. Pl. 68. 1753.

Eragrostis plumosa Link, Hort. Berol. 1: 192. 1827.

A low, tufted, branching annual, with slender, ascending or spreading culms, linear blades, and handsome oblong panicles, the minute spikelets mostly borne along the lower side of the ascending branches.

Open ground and waste places, warmer regions of both hemispheres, at low altitudes. Originally described from India.

ECUADOR: Milagro, *Hitchcock* 20179.

3. Eragrostis viscosa (Retz.) Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 1: 397. 1830.

Poa viscosa Retz. Obs. Bot. 4: 20. 1786.

Differing from *E. amabilis* in the viscid stiffer panicles and larger spikelets.

Fields and open ground, introduced from Asia. Originally described from India.

ECUADOR: Chanduy, *Spruce* 6432. Oil Camp between Guayaquil and Salinas. *Hitchcock* 20092. Portovelo, *Hitchcock* 21268.

4. Eragrostis hypnoides (Lam.) B. S. P. Prel. Cat. N. Y. 69. 1888.

Poa hypnoides Lam. Tabl. Encycl. 1: 185. 1791.

Plant much-branched, spreading, forming mats, the flowering culms mostly 5 to 10 cm. tall; blades 1.5 to 2 cm. long, spreading; panicles small, more or less capitate, the pale, many-flowered spikelets commonly 1 cm. long.

Moist open ground along streams throughout the United States and southward to Argentina. Originally described from tropical America.

ECUADOR: Milagro, *Hitchcock* 20168. Balao, *Eggers* 14558. Guayaquil, *Spruce* 6430 (Kew Herb.), Portovelo, *Rose* 23399.

BOLIVIA: Guanay, *Rusby* 230. Mapiri, *Rusby* 243. Beni River, *Rusby* 227. Reyes, *White* 1232.

5. Eragrostis cilianensis (All.) Link; Vign. Lut. Malpighia 18: 386. 1904.

Poa cilianensis All. Fl. Pedem. 2: 246. 1785.

Eragrostis major Host, Icon. Gram. Austr. 4: 14. 1809.

Eragrostis megastachya Link, Hort. Berol. 1: 187. 1827.

Culms erect or often spreading; panicles rather compact, 2 to 10 cm. long, greenish or often whitish, the spikelets many-flowered, larger than in the other annual species; plant giving off a disagreeable odor.

A European species, introduced in America, fields and waste places. Originally described from Europe.

ECUADOR: Between La Toma and Loja, *Hitchcock* 21401. Chanduy, *Spruce* 6427 (Kew Herb.).

PERU: Obrajillo, *Wilkes Expl. Exped.* Moquegua, *Weberbauer* 7438.

BOLIVIA: Cochabamba, *Hitchcock*, 22844. Bolivian Plateau, *Bang* 1078. Tarija, *Fries* 1061.

6. Eragrostis glomerata (Walt.) L. H. Dewey, Contr. U. S. Nat. Herb. 2: 543. 1894.

Poa glomerata Walt. Fl. Carol. 80. 1788.

Eragrostis conferta Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 1: 409. 1830.

Robust, sometimes as much as 2 meters tall and appearing like a perennial, freely branching, the branches sometimes fascicled; blades elongate; panicles as much as 40 cm. long, narrowly contracted, densely flowered, pale, the spikelets minute.

Moist low ground, southeastern United States to Uruguay. Originally described from South Carolina.

ECUADOR: Panigón Plantation, *Hitchcock* 20570. Guayaquil, *Jameson* 541.
PERU: Piura, *Spruce* 6429 (Kew Herb.).
BOLIVIA: Covendo, *White* 915, 1000. Espía, *White* 613.

7. **Eragrostis peruviana** (Jacq.) Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 1: 396. 1830.
Poa peruviana Jacq. Coll. Bot. 1: 107. 1786.
Eragrostis deserticola R. A. Phil. Fl. Atac. 55. 1860.
Eragrostis peruviana var. *brachythyrsa* Pilger, Bot. Jahrb. Engler 37: 375. 1906. (*Weberbauer* 1462.)

A spreading pubescent annual, with decumbent culms 10 to 40 cm. tall, flat blades, and dense, ovoid, oblong, or club-shaped panicles 1 to 5 cm. long.

Sandy soil, southern Peru and northern Chile. No locality cited with the original description. A portion of the type, presumably from Peru, is in the U. S. National Herbarium.

PERU: Chorrillos. *Macbride* 5874. Lurin, *Macbride* 5925. Mollendo, *Hitchcock* 22351; *Cook & Gilbert* 56; *Rose* 18980, 18981. Arequipa, *Holway* in 1920; *Cockerell* in 1925.

8. **Eragrostis maypurensis** (H. B. K.) Steud. Syn. Pl. Glum. 1: 276. 1854.
Poa maypurensis H. B. K. Nov. Gen. & Sp. 1: 161. 1816.
Eragrostis vahlii Nees, Agrost. Bras. 499. 1829.
Eragrostis amoena Presl, Rel. Haenk. 1: 275. 1830.
Eragrostis panamensis Presl, Rel. Haenk. 1: 277. 1830.

Culms erect from a spreading base, 10 to 30 cm. tall, the narrow blades mostly near the base; panicles brownish or yellowish, narrow, the short branches somewhat distant, stiffly ascending, spikelet-bearing from the base; spikelets linear, as much as 15 mm. long.

Open ground, especially in sandy soil, western Mexico to Brazil. Originally described from Venezuela.

BOLIVIA: Guanay, *Rusby* 192.

9. **Eragrostis articulata** Nees, Agrost. Bras. 502. 1829.

An erect or decumbent annual 10 to 40 cm. tall, with papillose-hispid sheaths and blades, and narrow open panicles about half the length of the entire plant, the branches ascending, the spikelets pediceled and about equally distributed along the branches.

Open dry ground, Brazil to Bolivia. Originally described from Brazil.

BOLIVIA: Buena Vista, *Steinbach* 5182, 6991. Charagua, *Herzog* 1236. Gran Chaco, *Fries* 1463.

ERAGROSTIS ARTICULATA VAR. GLABRESCENS Henr. Med. Rijks Herb. Leiden 40: 69. 1921. This is based on *Herzog* 1309a, and is differentiated by having glabrous foliage. Doctor Henrard has kindly sent to the U. S. National Herbarium a spikelet from the type specimen. This spikelet is more slender and has more florets than those of *E. articulata*, and appears to belong to a distinct species.

10. **Eragrostis nigricans** (H. B. K.) Steud. Nom. Bot. ed. 2. 1: 563. 1840.
Poa nigricans H. B. K. Nov. Gen. & Sp. 1: 159. 1816.
Eragrostis subatra Jedw. Bot. Archiv Mez 5: 202. 1924. (*Bang* 80, cited as *Rusby* 80.)

A spreading annual, with decumbent culms as much as 50 cm. tall, and narrow dark panicles as much as 20 cm. long, the short main branches spreading but rather densely flowered and more or less implicate.

Open ground, fields, and waste places, Ecuador, whence originally described, to Bolivia. (Near Quito, *Bonpland.*)

ECUADOR: Quito, *Harteman* 1, 44; *Sodiro; Arcade* 5; *Hitchcock* 21932; *Jameson* 249 (Kew Herb.). Riobamba, *Mille* 54; *Spruce* 5813. Ambato, *Hitchcock* 21742; *Pachano* 64. Quebrada Chalan, *Anthony & Tate* 441.

PERU: La Merced, *Hitchcock* 22130. Matucana, *Macbride & Featherstone* 223. Ollantaytambo, *Hitchcock* 22551. Cuzco, *Hitchcock* 22497, 22498. Chachapoyas, *Mathews* 3242 (Kew Herb.). Arequipa, *Cockerell* in 1925. Torata, *Weberbauer* 7405. Moquegua, *Weberbauer* 7447a.

BOLIVIA: Sorata, *Holway* 539. La Paz, *Bang* 21, 80; *Buchtien* 2, 562, 562a, 820, 6421. Palca, *Buchtien* 2535. Atocha, *Asplund* 6524. Oploca, *Hitchcock* 22889, 22928.

11. Eragrostis pilosa (L.) Beauv. Ess. Agrost. 162. 1812.

Poa pilosa L. Sp. Pl. 68. 1753.

A tufted weedy annual, pilose at the summit of the sheaths and in the axils of the lower panicle branches, otherwise glabrous; culms ascending, mostly 20 to 30 cm. tall; panicles oblong, loosely many-flowered, commonly about one-third the entire height of the plant; spikelets 4 to 6 mm. long.

Open ground, fields, and waste places, warm and temperate regions of both hemispheres. Originally described from Italy.

ECUADOR: Quito, *Arcade* 6. Baños, *Hitchcock* 21903. Alausí, *Hitchcock* 20690. Huigra, *Hitchcock* 20613. Chanduy, *Spruce* 6428 (Kew Herb.).

PERU: Obrajillo, *Wilkes Expl. Exped.* Matucana, *Macbride & Featherstone* 164, 225, 393, 451. Chosica, *Macbride & Featherstone* 551.

BOLIVIA: Sorata, *Mandon* 1329. La Paz, *Buchtien* 820. Cotaña, *Buchtien* 3135. La Florida, *Hitchcock* 22644. Yanacachi, *Buchtien* 428. Cochabamba, *Buchtien* 2515, 2516; *Hitchcock* 22804, 22846, 22867; *Holway* 356, 372. Oploca, *Hitchcock* 22900. Tupiza, *Hitchcock* 22922. Tarija, *Fries* 1100. Padcaya, *Fiebrig* 2528 (Kew Herb.).

12. Eragrostis mexicana (Lag.) Link, Hort. Berol. 1: 190. 1827.

Poa mexicana Lag. Gen. & Sp. Nov. 3. 1816.

Differing from *E. pilosa* in the larger spikelets, nearly 2 mm. wide.

Fields and waste places, southwestern United States to Chile. Originally described from Mexico.

ECUADOR: Guayaquil, *Mille* 19. Azogues, *Rose* 22798. Huataxi, *Spruce* 6092. Guaranda, *Jameson* 162 (Kew Herb.).

PERU: Lurin, *Macbride* 5954.

BOLIVIA: Sirupaya, *Buchtien* 428 in part.

13. Eragrostis limbata Fourn. Mex. Pl. 2: 116. 1886.

Similar to *E. pilosa* and *E. mexicana*, but the panicle erect, often purplish, and the axils glabrous.

A weed in cultivated ground or waste places. Mexico, whence originally described, to northern South America.

PERU: Matucana, *Macbride & Featherstone* 224; *Savatier* in 1877 (Kew Herb.). Moquegua, *Weberbauer* 7447.

14. Eragrostis weberbaueri Pilger, Bot. Jahrb. Engler 37: 375. 1906.

An erect perennial, with slender culms 20 to 30 cm. tall, slender fine-pointed blades 3 to 10 cm. long, and pale spikelike panicles 3 to 6 cm. long, interrupted below.

Rocky slopes, Peru, whence originally described. (Type, *Weberbauer* 3189.)

PERU: Between Samanco and Caraz, *Weberbauer* 3189. Arequipa, *Weberbauer* 6836; *Cockerell* in 1925. Matucana, *Macbride & Featherstone* 303. Puruchuca, *Mathews* 770 (Kew Herb.). Cotahuasi, *Weberbauer* 6870 (Field Mus.).

15. Eragrostis attenuata Hitchc., sp. nov.

A cespitose perennial; culms slender, glabrous, prostrate or ascending, 20 to 60 cm. long; sheaths glabrous or sparsely pilose, longer than the internodes, densely pilose at the throat, those of the culm 2 to 4; ligule densely pilose with hairs about 1 mm. long; blades conspicuously papillose-pilose on both surfaces, flat or those of the innovations involute, mostly 2 to 4 cm. long, sometimes as much as 7 cm., about 1 mm. wide, rarely as much as 3 mm., mostly spreading, sharp-pointed; panicles very slender, straight or somewhat flexuous, spikelike, somewhat interrupted, purplish, as much as 40 cm. long, usually more than half the length of the entire culm, the branches short and appressed, the lower as much as 3 cm. long, usually less than 1 cm. long; spikelets mostly 3 or 4-flowered, about 2 mm. long, the pedicel less than 1 mm. long, the rachilla at maturity disarticulating between the florets; glumes narrow, unequal, the first about 1 mm. long, the second a little longer, scaberulous on the keels; first lemma somewhat compressed, ovate, acutish, scaberulous all over the back, a little more than 1 mm. long, the lateral nerve distinct but not conspicuous, the second and third lemmas similar to the first but shorter; palea a little shorter than the lemma, minutely scaberulous on the keels; caryopsis oblong, about 0.6 mm. long.

Type in the U. S. National Herbarium, no. 1,164,909, collected on sandy slopes of hills about three kilometers back of Mollendo, Peru, November 17, 1923, by A. S. Hitchcock (no. 22424).

This species is distinguished by the attenuate panicles and the scaberulous lemmas. It was abundant in the type locality but no other specimens have been seen. The region around Mollendo is a desert, and vegetation thrives only after light rains that fall at long intervals.

16. Eragrostis tenax (H. B. K.) Steud. Nom. Bot. ed. 2. 1: 564. 1840.

Poa tenax H. B. K. Nov. Gen. & Sp. 1: 160. 1860.

Eragrostis lehmannii Pilger, Bot. Jahrb. Engler 27: 32. 1899. (*Lehmann* 5823, cited as 5283.)

Eragrostis densissima Hack, Oesterr. Bot. Zeitschr. 52: 304. 1902. (Tumbaco, *Sodiro* in 1886.)

An erect cespitose perennial 1 to 2 meters tall, with more or less pubescent sheaths, elongate narrow blades, and contracted, almost spikelike panicles as much as 50 cm. long.

Sandy plains, Ecuador. Originally described from near Quito. (*Bonpland.*)

ECUADOR: Tumbaco and Pomasqui, *Sodiro* in 1886. Cotocallao, *Mille* 271. Baños, *Lehmann* 442a. Quito, *Jameson* (Kew Herb.).

17. Eragrostis lurida Presl, Rel. Haenk. 1: 276. 1830.

Eragrostis contristata Nees & Mey. Nov. Act. Acad. Caes. Leop. Carol. 19: Suppl. 1: 31. 1841; 163. 1843. (Lake Titicaca.)

Eragrostis bahiensis var. *boliviensis* Henr. Med. Rijks Herb. Leiden 40: 68. 1921. (*Mandon* 1332.)

An erect or prostrate perennial, from a few centimeters to as much as 1 meter tall, with narrow dark panicles as much as 30 cm. long in large plants, the spikelets short-pediceled and congested along the stiffly ascending or spreading primary branches, these distant or sometimes contiguous, forming a dense panicle.

Fields and waste places, Ecuador to Bolivia. Originally described from Peru.

ECUADOR: Quito, *Sodiro*. Pomasqui, *Mille* 273. Ambato, *Rose* 22334; *Hitchcock* 21724, 21728. Alausí, *Hitchcock* 20691, 20713. Riobamba, *Mille* 52; *Spruce* 5808 (Kew Herb.).

PERU: Matucana, *Macbride & Featherstone* 251, 252. Tarma, *Hitchcock* 22162, 22163; *Macbride & Featherstone* 987. Ollantaytambo, *Hitchcock* 22486, 22518, 22519, 22554. Cuzco, *Hitchcock* 22463, 22500. Baños, *Wilkes Expl. Exped.*

BOLIVIA: La Paz, *Buchtien* 847; *Rusby* 49. Summit between Oruro and Cochabamba, *Hitchcock* 22869. Sorata, *Mandon* 1332.

18. Eragrostis pastoensis (H. B. K.) Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. **2**[1]: 71. 1836.

Poa pastoensis H. B. K. Nov. Gen. & Sp. **1**: 160. 1816.

Poa setifolia Benth. Pl. Hartw. 262. 1846.

Eragrostis contracta Pilger, Bot. Jahrb. Engler **37**: 376. 1906. (*Weberbauer* 2841.)

An erect or spreading, cespitose perennial, 20 to 50 cm. or as much as 1 meter tall, with erect blades, long involute-setaceous at tip, and narrow, contracted, almost spikelike panicles as much as 30 cm. long, long-pilose in the axils.

Dry hills and fields, Colombia, whence originally described, to Bolivia.

ECUADOR: Quito, *Sodiro; Mille* 272; *Spruce* 5407 (Kew Herb.); *Hartweg* 1452 (Kew Herb.). Between Malchinguí and Pomasqui, *Hitchcock* 20897, 20902. Baños, *Hitchcock* 21901. Between La Toma and Loja, *Hitchcock* 21407. Between Loja and San Lucas, *Hitchcock* 21484. Between Oña and Cuenca, *Hitchcock* 21591.

PERU: Ocros, *Weberbauer* 2663. Ollantaytambo, *Hitchcock* 22522.

19. Eragrostis montufari (H. B. K.) Steud. Nom. Bot. ed. 2. **1**: 563. 1840.

Poa montufari H. B. K. Nov. Gen. & Sp. **1**: 159. 1816.

Eragrostis buchtienii Hack. Repert. Nov. Sp. Fedde **6**: 157. 1908. (*Buchtien* 428.)

Eragrostis boliviensis Jedw. Bot. Archiv Mez **5**: 205. 1824. (*Mandon* 1330.)

An erect or spreading perennial 30 to 60 cm. tall, with more or less villous or sometimes glabrous sheaths, flat blades, and open panicles 10 to 25 cm. long, the main branches spreading, distant, naked below, the spikelets appressed along the upper half.

Dry plains and slopes, Ecuador to Bolivia. Originally described from Chillo, Ecuador. (Hacienda Montufar, *Bonpland.*)

ECUADOR: Huigra, *Hitchcock* 20758. Alausí, *Hitchcock* 20718. Between La Toma and Loja, *Hitchcock* 21410.

PERU: Mito, *Macbride & Featherstone* 1425. La Merced, *Hitchcock* 22131. Tarma, *Hitchcock* 22150. Cuzco, *Hitchcock* 22490.

BOLIVIA: Prov. Larecaja, *Mandon* 1329. Hacienda Casana, *Buchtien* 7140. Cotaña, *Buchtien* 3138. La Paz, *Bang* 201; *Buchtien* 848. La Florida, *Hitchcock* 22623. Coripata, *Hitchcock* 22684. Coroico, *Buchtien* 3638. Cochabamba, *Hitchcock* 22798, 22835, 22861; *Holway* 377. Sorata, *Mandon* 1328, 1329, 1330 (all in Kew Herb.). Without locality, *Cárdenas* (*Mulford Biol. Expl.*) 2144.

20. Eragrostis magna Hitchc., sp. nov.

Perennial; culms cespitose in large clumps, erect, stout, glabrous, about 3-noded, 1.5 meters tall, the lower internodes as much as 6 mm. thick; sheaths glabrous, somewhat villous on each side at the throat; ligule a ciliate line, less than 0.5 mm. long; blades elongate, flat or more or less involute, glabrous beneath, villous on the upper surface, 40 to 60 cm. long, as much as 7 mm. wide, tapering to a fine point; panicle narrow, rather loose, 30 to 50 cm. long, the main axis glabrous, densely villous in the axils of the main branches, more or less pilose in the axils of the branchlets, the main branches ascending,

as much as 20 cm. long, the branchlets bearing ascending branchlets, the lower of these as much as 5 cm. long, the secondary branchlets sometimes bearing few-flowered branchlets; pedicels, except the terminal ones, shorter than the spikelets, slender, flexuous, scabrous; spikelets brown or lead-color, 7 to 10 mm. long, mostly 7 to 10-flowered; glumes about equal, narrow, acute, 2.5 mm. long, glabrous, the second minutely scabrous on the keel; lemmas 2 to 2.5 mm. long, loosely imbricate, not hiding the rachilla, about 0.5 mm. wide (as folded), elliptic, scarcely flattened, the apex acutish; rachilla flexuous, disarticulating between the florets, minutely pilose at the base of the lemmas; palea as long as the lemma, obtuse, very minutely scabrous on the keels.

Type in the herbarium of the Field Museum, no. 535136, collected on steep rocky grasslands at Huacachi Estación near Muña, Peru, altitude 2,000 meters, May 20 to June 1, 1923, by J. Francis Macbride (no. 4069).

No other specimens than the type collection have been seen. The species has the aspect of *E. macrothyrsa* Hack. of Paraguay, but the lemmas are larger and the panicle less open.

21. Eragrostis bahiensis Schrad.; Schult. Mant. **2**: 318. 1824.

An erect perennial 30 to 80 cm. tall, with open or somewhat contracted, lead-colored panicles, the branches ascending or spreading, 5 to 15 cm. long, rather distant, naked below, the spikelets appressed along the upper part, or the whole panicle contracted (*Steinbach* 6889).

Sandy fields and grassy hills and plains, Brazil, whence originally described, to Bolivia and Argentina.

BOLIVIA: Samaipata, *Herzog* 1705. Coripata, *Hitchcock* 22681. Buena Vista, *Steinbach* 5184, 6881. Río Perdíz, *Steinbach* 6889.

22. Eragrostis expansa Link, Hort. Berol. **1**: 190. 1827.

An erect or spreading perennial, with slender culms 40 to 80 cm. tall, flat or loosely involute blades, and open gray-black panicles 10 to 15 cm. long, the branches ascending or spreading; spikelets short-pediceled, 8 to 15-flowered.

Open ground Brazil to Argentina and Bolivia. Originally described from Uruguay.

BOLIVIA: Río Perdiz, *Steinbach* 6899.

23. Eragrostis patula (H. B. K.) Steud. Nom. Bot. ed. 2. **1**: 564. 1840.

Poa patula H. B. K. Nov. Gen. & Sp. **1**: 158. 1816.

A spreading perennial, with decumbent culms 30 to 50 cm. tall, and open dark panicles 8 to 12 cm. long, the branches and branchlets spreading, somewhat flexuous.

Open ground, Ecuador. Originally described from Conocoto, near Quito. (*Bonpland.*)

ECUADOR: Quito, *Harteman* 5, 29, 55; *Mille* 371; *Hitchcock* 21931. Between Malchinguí and Pomasqui, *Hitchcock* 20904. Alausí, *Hitchcock* 20773.

PERU: Matucana, *Macbride* 2926. Huánuco, *Macbride* 3516.

24. Eragrostis pilgeriana Hitchc.

Eragrostis andicola Pilger, Bot. Jahrb. Engler **37**: 377. 1906. Not *E. andicola* Fries, 1905.

Eragrostis andicola forma *humilior* Pilger, Bot. Jahrb. Engler **37**: 377. 1906. (*Weberbauer* 3036, same locality as 3114.)

Eragrostis andicola var. *robustior* Pilger, Bot. Jahrb. Engler **37**: 377. 1906. (Ocros, *Weberbauer* 2746.)

An erect perennial with slender culms 30 to 50 cm. long, setaceous-involute blades, and an open elliptic-oblong panicle 10 to 15 cm. long; spikelets 3 to

8-flowered, lead-color, on slender flexuous pedicels; lemmas spreading, 3 mm. long; rachilla pilose.

Rocky slopes, Peru. Known only from Peru. (Type, *Weberbauer* 3114.)

PERU: Between Samanco and Caraz, *Weberbauer* 3114.

25. **Eragrostis lugens** Nees, Agrost. Bras. 505. 1829.

Eragrostis soratensis Jedw. Bot. Archiv Mez 5: 213. 1924. (*Mandon* 1331.)

An erect cespitose perennial 30 to 50 cm. tall, with more or less pilose sheaths, flat or involute blades, and open, rather diffuse, fragile panicles usually more than half the entire length of the culms, the axils somewhat pilose or the upper glabrous.

Dry plains and hills, southwestern United States to Argentina. Originally described from Brazil.

ECUADOR: Baños, *Hitchcock* 21914. Without locality, *Spruce* 5609.

PERU: Ollantaytambo, *Hitchcock* 22517. Juliaca, *Harlan* in 1914.

BOLIVIA: Sorata, *Rusby* 234, 239; *Mandon* 1331. Yungas, *Bang* 307. Coripata, *Hitchcock* 22680. La Paz, *Rusby* 45; *Holway* 463; *Buchtien* 849. Pasña, *Asplund* 6524. Coroico, *Hitchcock* 22727. Hacienda Casana, *Buchtien* 7121. Chulumani, *Hitchcock* 22708, 22710. Milluhuaya, *Buchtien* 4277. Cochabamba, *Hitchcock* 22821, 22853.

Much of our material agrees with *Mandon* 1331 (*E. soratensis*) in having the primary branches of the panicle stiffer, the axils glabrous or sparsely pilose, and somewhat larger spikelets. This form appears to intergrade with typical *E. lugens* from Brazil.

26. **Eragrostis polytricha** Nees, Agrost. Bras. 507. 1829.

An erect perennial as much as 1 meter tall, with hirsute sheaths, flat or loosely involute, hirsute blades, and open diffuse panicles about half the length of the entire plant; axils of panicles with a few long hairs; spikelets about 3-flowered.

Sandy plains, Brazil to Argentina and Bolivia. Originally described from Uruguay.

BOLIVIA: Buena Vista, *Steinbach* 6980.

27. **Eragrostis carazensis** Pilger, Bot. Jahrb. Engler 56: Beibl. 123: 27. 1920.

An erect perennial, with long, slender, more or less involute blades and an open elliptic panicle about 25 cm. long; spikelets yellowish green, 4 to 6 mm. long, 3 to 7-flowered; lemmas obtuse, 2.5 mm. long.

Open ground, Peru. Known only from the type collection.

PERU: Caraz, *Weberbauer* 2999.

The following species of *Eragrostis* have not been identified and the types have not been examined:

ERAGROSTIS ALBA Presl, Rel. Haenk. 1: 279. 1830. Described from Monterey, Calif. The type specimen at the National Museum, Prague, is labeled "Regio montana." It appears to be *E. virescens* Presl of Chile. Scribner[16] examined a duplicate in the Bernhardi Herbarium at the Missouri Botanical Garden, and referred it doubtfully to *E. pastoensis*.

POA OLMEDI H. B. K. Nov. Gen. & Sp. 1: 159. 1816. "Crescit in montibus Peruanis et Loxae ad vias, juxta domum botanici hispani Don Vicente Olmedo." This is a species of *Eragrostis* which, from the description, may be the same as

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[16] Rep. Mo. Bot. Gard. 10: 43. 1899.

E. montufari. Doctor Lecomte informs me that the type specimen can not be found in the Paris Herbarium.

ERAGROSTIS TRISTIS Jedw. Bot. Archiv Mez 5: 205. 1924. "Bolivia, ad Huancapamba (*Pflanz* nr. 359). Quechisla (*Bender* nr. 19); Peruvia, prope Tacna (*Meyen*)." From the description it may be *E. nigricans.*

ERAGROSTIS VILLAMONTANA Jedw. Bot. Archiv Mez 5: 197. 1924. "Bolivia, prov. Tarija, ad Villamontes (*Pflanz* nr. 632)."

ERAGROSTIS STENOCLADA Presl, Rel. Haenk. 1: 278. 1830. Published from mountains of Peru but the locality corrected in the Addenda to Monterey, California. The specimen in the National Museum at Prague is labeled "Luzon." It is *E. elongata* (Willd.) Jacq.

15. DISTICHLIS Raf. SALTGRASS

Plants dioecious; spikelets compressed, several-flowered, the glumes and lemmas firm, keeled, the lemmas faintly many-nerved.

Panicles of 1 to 3 spikelets; plants mostly only a few centimeters tall.
1. D. humilis.

Panicles usually with more than 3 spikelets; plants erect, mostly 10 to 20 cm. tall 2. D. spicata.

1. Distichlis humilis R. A. Phil. Anal. Mus. Nac. Chile Bot. 8: 86. 1891.

Culms mostly only a few centimeters tall, with crowded, spreading, folded, or involute blades about 1 cm. long, and small, scarcely exserted panicles of 1 to 3 spikelets.

Moist places, southern Peru to northern Argentina and Chile. Originally described from Antofagasta, Chile.

PERU: Chuquibambilla, *Hitchcock* 22450. Puno, *Shepard* 128.

BOLIVIA: Guaqui, *Herzog* 2515. Lake Titicaca, *Mandon* 1354. La Paz, *Buchtien* 860. Uyuni, *Asplund* 6525. Atocha, *Hitchcock* 22874, 22876.

2. Distichlis spicata (L.) Greene, Bull. Calif. Acad. 2: 415. 1887.

Uniola spicata L. Sp. Pl. 71. 1753.

Poa thalassica H. B. K. Nov. Gen. & Sp. 1: 157. 1816. (Peru.)

Distichlis maritima Raf. Journ. de Phys. 89: 104. 1819.

Uniola thalassica Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 1: 359. 1830.

Distichlis thalassica Desv. in Gay, Fl. Chil. 6: 397. 1853.

Culms erect from stout creeping rhizomes mostly 10 to 20 cm. tall, with conspicuously distichous leaves, the sheaths overlapping, the sharp-pointed blades spreading; panicles condensed, usually with more than 3 spikelets.

Moist, especially alkali, soil, seacoasts of the warmer parts of America, and in the interior of South America from Peru to Argentina. Originally described from the Atlantic coast of North America.

ECUADOR: Huano Valley, *Spruce* 5919.

PERU: Salaverry, *Macbride & Featherstone* 47. Pacasmayo, *Rose* 18518. Lima, *Wilkes Expl. Exped.* Arequipa, *Hitchcock* 22429.

BOLIVIA: La Paz, *Bang* 108; *Buchtien* 6417. Cochabamba, *Holway* 350; *Hitchcock* 22791, 22840, 22841. Uyuni, *Asplund* in 1921. Chiguana, *Asplund* 6527. Peña Blanca, *Hitchcock* 22921. Oploca, *Hitchcock* 22883, 22884, 22885, 22886, 22888, 22897.

16. UNIOLA L.

Spikelets strongly compressed, few to many-flowered, the lower 1 to 4 florets empty; glumes and lemmas keeled, firm, the glumes small, the lemmas faintly many-nerved; paleas rigid, the keels broadly winged.

Spikelets 1 to 2 cm. long; plant extensively stoloniferous_____1. U. pittieri.
Spikelets 5 mm. long or less; plant erect, cespitose_____2. U. condensata.

1. Uniola pittieri Hack. Oesterr. Bot. Zeitschr. **42**: 309. 1902.

A stout, glabrous, extensively stoloniferous perennial, with large contracted panicles 10 to 30 cm. long, the very flat spikelets 1 to 2 cm. long, about 1 cm. wide.

Sandy sea beaches, Mexico to Ecuador. Originally described from Costa Rica.

ECUADOR: Bahía de Caraquez, *Rowlee & Mixter* 1295. Guayaquil, *Jameson* (Kew Herb.).

2. Uniola condensata Hitchc., sp. nov.

An erect cespitose perennial; culms glabrous, 1 to 1.5 meters tall; sheaths glabrous; blades elongate, about as long as the culm, as much as 8 mm. wide, flat below, gradually attenuate to a fine point, glabrous, scabrous on the margins; panicle narrow, condensed, strict or somewhat nodding, 30 to 40 cm. long, 2 to 3 cm. wide, the axis scabrous to scabrous-pilose, the stiff 1-sided branches ascending or appressed, floriferous to base, closely imbricate or somewhat distant at base, 1 to 4 cm. long, densely flowered; spikelets on very short pedicels, flat, ovate or oblong, as much as 5 mm. long, 3 to 6-flowered; glumes narrow, acuminate, scabrous on the keel, the first 1 mm. long, the second 1.5 mm. long; lemmas firm smooth shining, acuminate, compressed-keeled, especially on upper half, rather obscurely 5-nerved toward the tip, about 3 mm. long, the lower 2 or 3 empty and smaller; palea a little shorter than the lemma.

Type in the U. S. National Herbarium, no. 1,164,907, collected on dry grassy slopes at Huigra, Province of Chimborazo, Ecuador, altitude 1,200 meters, July 4, 1923, by A. S. Hitchcock (no. 20333).

The only other collection seen is a fragment from a specimen in the Vienna Museum. This was collected by Spruce and bears the label, "Andes Quitenses. Huatasis in declivibus, frequens." The locality is probably Guatazi, mentioned by Spruce,[17] a ranch below Chunchi and consequently not far from Huigra, the type locality.

Uniola condensata has somewhat the aspect of *U. virgata* (Poir.) Griseb. of the West Indies. It differs in the elongate erect flat blades, those of *U. virgata* being involute and curled or tortuous, and in the larger spikelets and more strongly nerved lemmas.

17. ARUNDO L.

Spikelets perfect, 2 to several-flowered; glumes about equaling the spikelet; lemmas bidentate, cuspidate between the teeth, bearing copious long silky hairs on the back; rachilla naked.

1. Arundo donax L. Sp. Pl. 81. 1753. GIANT REED.

Tall reeds, with strong, sparingly branching culms, elongate scabrous-margined flat blades, and densely flowered, slightly drooping panicles 30 to 60 cm. long, the spikelets about 1 cm. long.

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[17] Wallace, Notes of a Botanist **2**: 237, 1908.

River banks and moist ground, warmer parts of the Old World. Cultivated in America for ornament and occurring from Texas to California and southward to Argentina as an escape. Originally described from southwestern Europe.

ECUADOR: Panigón Plantation, *Hitchcock* 20577. Mount Pichincha, *Jameson*. Riobamba, *Holway* 867. Ambato, *Rose* 22385.

BOLIVIA: Gran Chaco, *Fries* 1622. Coroico, *Hitchcock* 22724.

The stems are used for many purposes, such as laths and interlacing for the framework of huts. Called "carrizo."

18. PHRAGMITES Trin.

Spikelets 2 to several-flowered, the lowest floret staminate or neuter, its lemma elongate; glumes shorter than the florets; lemmas acuminate; rachilla densely clothed with long silky hairs.

1. **Phragmites communis** Trin. Fund. Agrost. 134. 1820. REED.

Arundo phragmites L. Sp. Pl. 81. 1753.

Phragmites phragmites Karst. Deutsch. Fl. 378. 1883.

A stout erect reed usually 2 to 4 meters tall, stoloniferous and rhizomatous, gregarious, sometimes covering large areas; blades flat, 30 to 40 cm. long, 1 to 3 cm. wide; panicle plumelike, 20 to 40 cm. long.

Swamps throughout the temperate regions of the world, extending into the Tropics. Originally described from Europe.

ECUADOR: El Recreo, *Eggers* 15813. Guayaquil, *Hitchcock* 21099½.

PERU: Obrajillo, *Wilkes Expl. Exped.* (Kew Herb.). Piura, *Spruce* 6434 (Kew Herb.).

BOLIVIA: Camataquí, *Fiebrig* 2954 (Kew. Herb.).

19. CORTADERIA Stapf. PAMPASGRASS

Mostly large tussock grasses, the leaves generally crowded at the base, the blades long and narrow, tapering to a slender point, usually very rough on the margins; spikelets several-flowered, the rachilla disarticulating near the base of the internodes, the lower shorter part glabrous, the upper longer part bearded, forming a stipe to the floret; rachilla and florets clothed with long hairs; glumes longer than the first floret (excluding awn), sometimes longer than all the florets; lemma tapering into a slender point or awn, or awned from between the slender teeth of a bifid apex; inflorescence a panicle, sometimes large and plumelike.—In all the species except *C. sericantha* the old sheaths become flattened and coiled at the base of the plant. The genus has been described as dioecious, but some of the species have perfect florets, though the anthers are small and the flowers appear to be cleistogamous.

Spikelets unisexual; plants dioecious; lemmas tapering to a soft slender scarcely awned point. A large reed with silvery or purplish panicles 30 to 60 cm. long ..... 1. C. rudiuscula.

Spikelets perfect; lemmas awned.

Apex of lemma bifid, the teeth ending in capillary awns ..... 2. C. bifida.

Apex of lemma entire or with 1 or 2 short teeth at base of awn.

Blades not villous; old sheaths becoming flat and spiral at base of culm; plants mostly 1 to 2 meters tall ..... 3. C. nitida.

Blades densely villous at base; old sheaths not coiled; plants mostly 20 to 40 cm. tall ..... 4. C. sericantha.

1. **Cortaderia rudiuscula** Stapf, Gard. Chron. III. 22: 396. 1897.

A large reed with a great basal mass of long narrow blades as much as 1.5 long and mostly less than 1 cm. wide, firm and tough, very scabrous on

the margins and under side of midrib, the flowering culm stout, 1 to 2 meters tall, the yellowish or purple-tinged panicle 30 to 60 cm. long, dense, but the branches drooping.

Slopes and gullies and along streams, Ecuador to Argentina and Chile, in the mountains. Originally described from Argentina.

ECUADOR: Alausí, *Hitchcock* 20700. Mount Pichincha, *Harteman* 19. Antisanilla, *Anthony & Tate* 328. Without locality, *Spruce* 6451 (Kew Herb.). Ambato, *Rose* 22381. Nabón, *Rose* 22997.

PERU: Goyllarisquisca, *Hitchcock* 22306, 22336. Río Marañón below Chavanillo, *Macbride & Featherstone* 2307. Ollantaytambo, *Cook & Gilbert* 1910; *Hitchcock* 22521. Cuzco, *Hitchcock* 22475. Matucana, *Macbride* 2936.

BOLIVIA: La Paz, *Shepard* 167; *Buchtien* 850; *Bang* 26. Palca, *Hitchcock* 22573. San Felipe, *Hitchcock* 22607. Chulumani, *Hitchcock* 22701. Cochabamba, *Hitchcock* 22828, 22852. Oploca, *Hitchcock* 22890, 22895, 22896. Tarija, *Fiebrig* 2656, 3043 (both Kew Herb.).

This includes *C. quila* (Nees & Mey.) Stapf, as described by Stapf in the article cited above. The specific name, however, goes back to *Arundo quila* Mol.,[18] a species of bamboo. *Chusquea quila* Kunth,[19] also, is based on *Arundo quila* Mol.

Cortaderia rudiuscula differs from *C. selloana* (Schult.) Aschers. & Graebn. (*C. argentea* Stapf) of Argentina and Chile in the looser, yellowish or purplish panicle, the panicle of the latter being dense, woolly, and silvery white. The rachilla of *C. selloana* is more slender, so that the spikelets appear more open and the florets more distant. *Cortaderia selloana* appears not to occur within our range.

2. Cortaderia bifida Pilger, Bot. Jahrb. Engler **37**: 374. 1906.

Cortaderia aristata Pilger, Bot. Jahrb. Engler **37**: 375. 1906. (*Weberbauer* 3349.)

Cortaderia bifida var. *grandiflora* Henr. Med. Rijks Herb. Leiden **40**: 67. 1921. (*Herzog* 2194.)

Culms mostly 1 to 1.5 meters tall, with tawny or purplish, rather loose panicles mostly 10 to 20 cm. long.

Rocky or partially wooded slopes, Ecuador to Bolivia. Originally described from Peru. (Type, *Weberbauer* 1328.)

ECUADOR: Tablón de Oña, *Rose* 23102.

PERU: Mito, *Macbride & Featherstone* 1822. Prov. Huamalies, Dept. Huánuco, *Weberbauer* 3349. Sandía, *Weberbauer* 1328.

BOLIVIA: Unduavi, *Buchtien* 2576; *Rusby* in 1886. Pongo, *Hitchcock* 22780; *White* 190. Mapiri, *Rusby* in 1886. Tablas, *Herzog* 2194.

3. Cortaderia nitida (H. B. K.) Pilger, Bot. Jahrb. Engler **37**: 375. 1906.

Arundo nitida H. B. K. Nov. Gen. & Sp. **1**: 149. 1816.

Danthonia hapalotricha Pilger, Bot. Jahrb. Engler **25**: 715. 1898.

Gynerium nitidum Pilger, Bot. Jahrb. Engler **27**: 31. 1899.

Gynerium columbianum Pilger, Bot. Jahrb. Engler **27**: 31. 1899.

Cortaderia sodiroana Hack. Oesterr. Bot. Zeitschr. **52**: 238. 1902. (Ecuador, *Sodiro.*)

Cortaderia columbiana Pilger, Bot. Jahrb. Engler **37**: 374. 1906.

Differing from *C. bifida* in the entire or slightly toothed lemma.

Paramos and mountain slopes, Venezuela to Peru. Originally described from Colombia.

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[18] Ess. Hist. Nat. Chili 279. 1789.

[19] Rév. Gram. 1: 138. 1829.

ECUADOR: "In regione silvatica subandina," *Sodiro* in 1872. Between Malchinguí and Pomasquí, *Hitchcock* 20855, 20862. Mount Pichincha, *Sodiro* in 1875; *Mille* 322. Between Oña and Cuenca, *Hitchcock* 21619. Between La Toma and Loja, *Hitchcock* 21439. Between San Lucas and Oña, *Hitchcock* 21506. Between Cuenca and Huigra, *Hitchcock* 21690.

PERU: Between Culnai and Obrajillo, *Wilkes Expl. Exped.* Paucartambo, *Weberbauer* 6924 (Field Mus.).

Cortaderia nitida and *C. bifida* may be different forms of the same species. In habit and general aspect they are very much alike. While the writer was collecting in the Andes he distinguished only two species (aside from the little *C. sericantha*), basing the separation on the aspect of the plants. These two were the large species (*C. rudiuscula*) with large silvery panicles a half meter long, and the smaller species (*C. nitida*) with much smaller, tawny or purplish, not silvery panicles.

4. Cortaderia sericantha (Steud.) Hitchc.

Danthonia sericantha Steud. Syn. Pl. Glum. **1**: 246. 1854.

An erect perennial growing in tussocks, with culms 15 to 30 cm. tall, firm involute blades flat at base, the lower part and the summit of the sheath densely felty-villous, the panicles ovoid or oblong, dense and spikelike, 3 to 6 cm. long, more or less included in the upper sheath, scarcely rising above the stiff blades.

Paramos, Colombia to Peru. Originally described from Mount Antisana, Ecuador, the type collected by *Jameson*.

ECUADOR: Mount Chimborazo, *Hitchcock* 21983. Mount Pichincha, *Mille* 288. Mount Cotopaxi, near snow line, *Stübel* 292. Without locality, *Sodiro* (Cotopaxi, in Kew Herb.). "Eastern Cordillera, alt. 13,000 feet," *Jameson* 93 (Kew Herb.).

PERU: Mito, *Macbride & Featherstone* 1890.

This species is allied to the other species of *Cortaderia* in the structure of the spikelet, but does not have the ensiform, strongly serrate blades of those species. It is also much smaller in all its parts except the spikelets. The glumes are longer than all the florets, as in *Danthonia*, but otherwise the structure is that of *Cortaderia*. The rachilla disarticulates above the base of each joint, leaving a villous point below each floret and a glabrous prolongation above. The lemmas are long-villous, bifid at the apex, the teeth short, the mid vein extending into a straight, flattish, somewhat contorted awn, as in *C. nitida*.

20. GYNERIUM Humb. & Bonpl.

Plants dioecious; spikelets several-flowered; pistillate spikelets with long-attenuate glumes and smaller long-silky lemmas; staminate spikelets with shorter glumes and glabrous lemmas.

1. Gynerium sagittatum (Aubl.) Beauv. Ess. Agrost. 138. *pl. 24. f. 6.* 1812.

UVA GRASS.

Saccharum sagittatum Aubl. Pl. Guian. **1**: 50. 1775.

Gynerium saccharoides Humb. & Bonpl. Pl. Aequin. **2**: 112. *pl. 115.* 1809.

Stout reeds, often 10 meters tall, the culms clothed below with old sheaths, the blades having fallen, the sharply serrulate blades commonly 2 meters long and 4 to 6 cm. wide (forming a great fan-shaped summit to the sterile culms), and pale, plumy, densely flowered panicles 1 meter long or more, the main axis erect, the branches drooping.

River banks and low ground, forming dense colonies, West Indies and southern Mexico to Paraguay, at low altitudes. Originally described from French Guiana.

ECUADOR: Teresita, *Hitchcock* 20517. Panigón Plantation, *Hitchcock* 20556. Bucay, *Rose* 22435. Ventura, *Rose* 23510.

PERU: Colonia Perené, *Hitchcock* 22123. La Merced, *Macbride* 5251. Callao, *Wilkes Expl. Exped.*

BOLIVIA: Coripata, *Hitchcock* 22683. Mapiri, *Buchtien* 1177. Covendo, *White* 901, 984. Huachi, *White* 297.

21. DACTYLIS L.

Spikelets 2 to 5-flowered, strongly compressed, subsessile in dense fascicles, these at the ends of stiff naked panicle branches; glumes and lemmas keeled, mucronate or the lemma awn-tipped.

1. Dactylis glomerata L. Sp. Pl. 71. 1753. ORCHARD GRASS.

A rather coarse roughish perennial, commonly about 1 meter tall, with flat blades and panicles of few to several branches naked at base, bearing toward the ends clusters of densely crowded. sparsely pilose spikelets, these 0.8 to 1 cm. long.

A native of Europe, now common in the temperate parts of North America; occasionally escaped from cultivation at temperate altitudes in the Andes.

ECUADOR: Near Quito, *Harteman* 49, 73.

22. MELICA L.

Spikelets 2 to few-flowered, in our species falling entire, the upper 2 or 3 lemmas sterile, smaller and convolute together in a club-shaped mass (called the rudiment); glumes somewhat unequal, thin, papery, with conspicuous scarious margins; lemmas convex, several-nerved, awnless in our species.

Blades flat, 2 to 6 mm. wide ..... 1. M. scabra.
Blades involute, narrow ..... 2. M. adhaerens.

1. Melica scabra H. B. K. Nov. Gen. & Sp. 1: 164. 1816.

Melica pallida H. B. K. Nov. Gen. & Sp. 1: 164. 1816. (Quito, *Bonpland.*)

Melica pyrifera Hack. Oesterr. Bot. Zeitschr. 52: 307. 1902. (*Jelski* 590.)

Melica majuscula Pilger, Notizbl. Bot. Gart. Berlin 8: 453. 1923. (Cuzco, *Weberbauer* 4877; Ocros, *Weberbauer* 2750.)

Melica cajamarcensis Pilger, Notizbl. Bot. Gart. Berlin 8: 454. 1923. (Dep. Cajamarca, *Weberbauer* 3864, 4138.)

Melica weberbaueri Pilger, Notizbl. Bot. Gart. Berlin 8: 455. 1923. (Dept. Libertad, *Weberbauer* 7198.)

Melica weberbaueri var. *decolorata* Pilger, Notizbl. Bot. Gart. Berlin 8: 455. 1923. (Caraz, *Weberbauer* 3034.)

Melica weberbaueri var. *violascens* Pilger, Notizbl. Bot. Gart. Berlin 8: 455. 1923. (Matucana, *Weberbauer* 110.)

A weak, decumbent, straggling, branching perennial, with culms as much as 1 meter long, retrorsely scabrous sheaths, flat blades, and narrow open panicles 10 to 20 cm. long, the branches ascending or spreading, floriferous to the base, the spikelets on flexuous pedicels, pale or purple, mostly with 2 perfect florets.

In rocky places among shrubs, Ecuador to Bolivia. Originally described from Ecuador. (Pomallacta, southeast of Alausí, *Bonpland.*)

ECUADOR: Pifo, *Mille* 289. Huigra, *Hitchcock* 20344, 20738; *Rose* 22540. Cuenca, *Rose* 24032.

PERU: Matucana, *Macbride & Featherstone* 281, 365, 454. Llata, *Macbride & Featherstone* 2232. Yanahuanca, *Macbride & Featherstone* 1223. Callacate, *Jelski* 590. Obrajillo, *Wilkes Expl. Exped.* Cuzco, *Hitchcock* 22461; *Holway* 746.

BOLIVIA: Sorata, *Mandon* 1343 (Kew Herb.).

The types of the species and varieties described by Pilger have not been examined, and the names are referred to *M. scabra* as synonyms from the descriptions.

2. Melica adhaerens Hack. Repert. Nov. Sp. Fedde **6**: 158. 1908.

Resembling *M. scabra*, but blades narrow, mostly involute; spikelets on the average shorter, with 1 perfect floret.

Shady banks, Bolivia. (Type, *Buchtien* 851.)

BOLIVIA: Sorata, *Mandon* 1357. La Paz, *Buchtien* 505, 851; *Rusby* 52; *Bang* 30; *Holway* 457; *Hitchcock* 22565. Cochabamba, *Holway* 384.

23. ANTHOCHLOA Nees

Spikelets few-flowered, subsessile and imbricate on a simple axis, the rachilla disarticulating above the glumes and between the florets; glumes (in our species) similar to the lemmas but much smaller; lemmas thin-membranaceous, flabelliform, whitish, petal like; palea narrower than the lemma, hyaline.

1. Anthochloa lepidula Nees & Mey. in Meyen, Reis. Erd. **2**: 14. 1835.

Anthochloa lepida Nees & Mey. Nov. Act. Acad. Caes. Leop. Carol. **19**: Suppl. **1**: 33. 1841; 165. 1843.

Anthochloa rupestris Remy, Ann. Sci. Nat. III. Bot. **6**: 347. 1846. (Lagunas de Potosi, *D'Orbigny*.)

A dwarf cespitose soft lax perennial, mostly less than 10 cm. tall, with pale papery ovoid condensed panicles 1 to 1.5 cm. long, shorter than the flat or folded blades.

Alpine regions, Peru and Bolivia. Originally described from Lake Titicaca, Peru. (*Meyen*.)

PERU: Casapalca, *Macbride & Featherstone* 825.

BOLIVIA: Comanche, *Asplund* 6526. Cerro de Palca. *Herzog* 2100. Sorata, *Mandon* 1272. Chacaltaya, *Buchtien* 1196.

24. ORTHOCLADA Beauv.

Spikelets articulate below the glumes, 1-flowered with a prolongation of the rachilla, or 2-flowered, the florets distant; glumes and lemmas acuminate.

1. Orthoclada laxa (Rich.) Beauv.; Nees, Agrost. Bras. 522. 1829.

Aira laxa Rich. Act. Soc. Hist. Nat. Paris **1**: 106. 1792.

Orthoclada rariflora Beauv. Ess. Agrost. 69. *pl. 14, f. 9*. 1812.

A stoloniferous perennial; flowering culms ascending, leafy, simple, commonly 1 meter long; blades slender-petioled, lanceolate, mostly 12 to 15 cm. long, about 2.5 cm. wide; panicle large, as broad as long, the long slender naked branches and capillary branchlets at first erect, finally stiffly divergent, bearing 1 to few spikelets at the extremities.

Rich woods, southern Mexico to Brazil and Peru. Originally described from Guiana.

ECUADOR: Balao, *Eggers* 14724.

PERU: San Gavân, *Lechler* 2432 (Kew Herb.).

25. ZEUGITES Schreb.

Spikelets few to several-flowered, the lowest floret perfect, the others staminate, the rachilla joint between the perfect and staminate florets elongate; glumes and fertile lemma herbaceous, broad, with transverse veins between the nerves, obtuse or truncate, the glumes about half as long as the lemma; sterile lemmas membranaceous, narrower, acute.

1. Zeugites mexicana (Kunth) Trin.; Steud. Nom. Bot. ed. 2. **2**: 798. 1841.
Despretzia mexicana Kunth, Rév. Gram. **2**: 485. *pl. 157*. 1831.
Senites mexicana Hitchc. Contr. U. S. Nat. Herb. **17**: 370. 1913.

A slender branching perennial, with smooth, wiry, dark brown culms resembling fern stipes, ovate petioled blades 1 to 3 cm. long, and open few-flowered panicles 2 to 4 cm. long, the spikelets falling entire.

Moist shady banks, Mexico to Bolivia. Originally described from Mexico.

PERU: Panao, *Macbride* 3621.

BOLIVIA: Bella Vista, *Hitchcock* 22751. Coripata, *Bang* 2131. Yungas, *Rusby* 18. Yanacachi, *Buchtien* 433.

26. TRIODIA R. Br.

Spikelets several-flowered; lemmas broad, rounded on the back, 2-lobed at apex, 3-nerved, the nerves pubescent below, produced as teeth at the summit.

1. Triodia avenacea H. B. K. Nov. Gen. & Sp. **1**: 156. *pl. 48*. 1816.

A low cespitose perennial 10 to 20 cm. tall, with folded, falcate, mostly basal blades 1 to 2 cm. long, and ovoid, few-flowered, rather dense panicles 1 to 3 cm. long, of large pale spikelets.

Dry plains and hills, southwestern United States and Mexico; Bolivia and Argentina. Originally described from Mexico.

BOLIVIA: Uyuni, *Asplund* 6500. Atocha, *Asplund* 8466.

URALEPIS ANDERSSONII Areschoug, Svensk. Freg. Eugenies Resa 119. 1910; Repert. Nov. Sp. Fedde **10**: 301. 1912. Described from "Ecuador: circa Guajaquil et in insula Puna." I have not been able to identify this species.

27. COTTEA Kunth

Spikelets several-flowered; lemmas rounded on the back, villous below, prominently 9 to 11-nerved, the nerves extending partly into awns of irregular size and partly into awned teeth.

1. Cottea pappophoroides Kunth, Rév. Gram. **1**: 84. 1829.

An erect cespitose perennial 30 to 60 cm. tall, with flat blades and narrow, purplish, rather loose panicles 10 to 15 cm. long.

Dry plains, southwestern United States and Mexico; Ecuador to Argentina. Originally described from Peru, no collector nor definite locality being given.

ECUADOR: Chanduy, *Spruce* 6444.

PERU: Chosica, *Macbride* 2876. Huánuco, *Macbride* 3240.

28. PAPPOPHORUM Schreb.

Spikelets 1 to 3-flowered, the upper sterile; glumes thin, subequal; lemma subindurate, dissected at the summit into about 13 slender awns, the second and third florets reduced, closely appressed to the palea, the awns of all the florets together forming a pappuslike crown, falling attached to the fruit.

Culms mostly 1 meter or more tall; panicle pale, mostly 20 to 30 cm. long. **1. P. alopecuroideum.**

Culms mostly less than 50 cm. tall; panicles 2 to 10 cm. long.
Nodes pilose; awns plumose ..... **2. P. wrightii.**
Nodes glabrous; awns scabrous ..... **3. P. mucronulatum.**

1. Pappophorum alopecuroideum Vahl, Symb. Bot. **3**: 10. 1794.
Pappophorum laguroideum Schrad.; Schult. Mant. **2**: 342. 1824.

A tufted glabrous perennial, with erect culms 1 meter tall or more, long involute blades, and pale, elongate, spikelike, densely flowered panicles, softly bristly from the numerous delicate awns.

Rocky soil, southern Mexico and West Indies to Argentina. Originally described from the West Indies.

PERU: Huánuco, *Macbride* 3238.

2. Pappophorum wrightii S. Wats. Proc. Amer. Acad. 18: 178. 1883.

A cespitose perennial, with slender, erect or decumbent culms 20 to 40 cm. tall, narrow involute blades, and dense spikelike lead-covered panicles 2 to 5 cm. long.

Dry plains and rocky hills, southwestern United States and Mexico; Peru and Bolivia. Originally described from Texas.

PERU: Cotahuasi, *Weberbauer* 6869 (Field Mus.). Moquegua, *Weberbauer* 7439.

BOLIVIA: Tarija, *Fries* 1221.

3. Pappophorum mucronulatum Nees, Agrost. Bras. 412. 1829.

Pappophorum vaginatum Buckl. Prel. Rep. Geol. Agr. Surv. Tex. App. 1. 1866.

Pappophorum apertum Munro; Scribn. Bull. Torrey Club 9: 148. 1882.

An erect cespitose perennial, with wiry culms 30 to 50 cm. tall, narrow, flat, or loosely involute blades, and pale or purplish, spikelike panicles 5 to 10 cm. long.

Dry plains and hills, southwestern United States to Mexico; Brazil, whence originally described, to Argentina and Bolivia.

BOLIVIA: Tarija, *Fries* 1099. Cochabamba, *Holway* 367.

29. AGROPYRON Gaertn. WHEATGRASS

Spikelets few to several-flowered, solitary (or rarely in pairs), sessile, placed flatwise at each joint of a continuous rachis, the rachilla disarticulating above the glumes and between the florets; glumes two, equal, firm, several-nerved, usually shorter than the first lemma, acute or awned, rarely obtuse or notched; lemmas convex on the back, rather firm, 5 to 7-nerved, usually acute or awned from the apex.

Lemmas awnless; glumes prominently several-nerved, more than 1 cm. long.
1. A. attenuatum.

Lemmas short-awned; glumes inconspicuously few-nerved, less than 1 cm. long.
2. A. breviaristatum.

1. Agropyron attenuatum (H. B. K.) Roem. & Schult. Syst. Veg. 2: 751. 1817.

Triticum attenuatum H. B. K. Nov. Gen. & Sp. 1: 180. 1816.

An erect, loosely tufted perennial with culms as much as 1 or 2 meters tall, the base decumbent or sending out more or less well-marked rhizomes; blades mostly 2 to 4 mm. wide, flat or loosely involute; spike erect, usually dense, sometimes 1-sided, 10 to 15 cm. long; lemmas awnless or mucronate.

Grassy or shrubby slopes, Ecuador to Bolivia. Originally described from near Quito. (*Bonpland.*)

ECUADOR: Tulcán, *Hitchcock* 21093. Between Malchinguí and Pomasqui, *Hitchcock* 20856. Between Otavalo and Malchinguí, *Hitchcock* 20818. Mount Pichincha, *Harteman* 18, 61. Quito, *Mille* 264; *Jameson* 305, 306 (both Kew Herb.). Ambato, *Hitchcock* 21714. Riobamba, *Sodiro* in 1891; *Mille* 25, 263; *Holway* 869. Alausí, *Hitchcock* 20722. Without locality, *Spruce* 5925 (Kew Herb.).

PERU: Chinche, *Macbride & Featherstone* 1281. La Quinhua, *Hitchcock* 22263. Goyllarisquisca, *Hitchcock* 22297. Oroya, *Hitchcock* 22185; *Macbride & Featherstone* 957.

BOLIVIA: Pongo, *Hitchcock* 22766. La Paz, *Holway* 427; *Buchtien* 871; *Asplund* 6460. Palca, *Buchtien* 2537. Sorata, *Mandon* 1375 (Kew Herb.).

2. Agropyron breviaristatum Hitchc., sp. nov.

Perennial, loosely cespitose, the bases of the culms decumbent and branched, forming short rhizomes; culms glabrous, as much as 1 meter tall; sheaths glabrous, or sometimes puberulent on the innovations, the auricles short; ligule ovate, thin, pale, soon lacerate, about 3 mm. long; blades flat, scaberulous, sometimes puberulent on the innovations, 10 to 20 cm. long, 2 to 4 mm. wide; spike slender, nodding or drooping, rather dense, sometimes interrupted below, 10 to 20 cm. long, the rachis scabrous on the angles; spikelets 3 to 5-flowered, 1 to 1.5 cm. long; glumes 3-nerved, scabrous on the nerves, acuminate or short-awned, the first 7 to 9 mm. long, the second a little longer and wider; lemmas 5-nerved, more or less scaberulous on the back, 8 to 9 mm. long, gradually narrowed into an awn 2 to 3 mm. long, the joints of the rachilla scaberulous; palea narrow, obtuse, scabrous on the keels, about as long as the lemma.

Type in the U. S. National Herbarium, no. 1,164,910, collected on the side of a ravine, north of Cuzco, Peru, November 30, 1923, by A. S. Hitchcock (no. 22462).

Differing from *A. attenuatum*, the common species of the Andes region, in the acuminate glumes, awned lemmas, drooping spike, and the long ligule.

Moist banks, Peru and Bolivia.

PERU: Goyllarisquisca, *Hitchcock* 22329. Cuzco, *Hitchcock* 22462. Ollantaytambo, *Hitchcock* 22538.

BOLIVIA: Isla del Sol, *Asplund* 6461.

30. ELYMUS L. WILD RYE

Spikelets 2 to 6-flowered, sessile in pairs at each node of a continuous rachis; lemmas rounded on the back or nearly terete, obscurely 5-nerved, usually awned from the tip.

1. Elymus angulatus Presl, Rel. Haenk. 1: 264. 1830.

Elymus andinus Trin. Linnaea 10: 304. 1836.

An erect glabrous perennial as much as 1 meter tall, with culms erect from a spreading base, flat blades 2 to 6 mm. wide, and an erect or somewhat nodding spike 7 to 15 cm. long, the awns 5 to 15 mm. long, often divergently curved with age.

Cliffs and grassland, Peru to Argentina. Originally described from Peru. (*Haenke.*)

PERU: Goyllarisquisca, *Hitchcock* 22319. Cerro de Pasco, *Hitchcock* 22267. La Quinhua, *Hitchcock* 22278. Oroya, *Hitchcock* 22180. Río Blanco, *Macbride & Featherstone* 650. Baños, *Wilkes Expl. Exped.*

BOLIVIA: Tupiza, *Hitchcock* 22923. Oploca, *Hitchcock* 22892.

31. HORDEUM L. BARLEY

Spikelets 1-flowered, in clusters of 3 at each joint of an articulate rachis, the middle spikelet sessile, perfect, the lateral spikelets stipitate, reduced to the awnlike glumes; glumes and lemmas awned.—In cultivated barley the rachis is continuous and in most varieties the lateral spikelets are developed.

Plants annual.
- Culms erect; glumes not ciliate ..... 1. H. vulgare.
- Culms spreading; some of the glumes ciliate ..... 2. H. murinum.

Plants perennial.
- Awns of fertile florets less than 1 cm. long.
  - Fertile lemma acuminate or short-awned ..... 3. H. muticum.
  - Fertile lemma with an awn about 5 mm. long ..... 4. H. nodosum.

Awns of fertile florets more than 1 cm. long.

Keels of palea close together; prolongation of rachilla inconspicuous.

5. H. halophilum.

Keels of palea distant; prolongation of rachilla conspicuous, half as long as palea——6. H. comosum.

1. Hordeum vulgare L. Sp. Pl. 84. 1753. BARLEY.

An erect annual with flat blades and erect spikes with long erect awns (in beardless barley the awns reduced and crumpled).

Commonly cultivated in temperate regions; occasionally escaped or persistent in old fields. Originally described from cultivated specimens.

ECUADOR: Huigra, *Rose* 22221.

PERU: Mito, *Macbride* 3429. Cuzco, *Hitchcock* 22457. Aguas Calientes, *Cook & Gilbert* 189. Between Sicuani and Tinta, *Cook & Gilbert* 222.

2. Hordeum murinum L. Sp. Pl. 85. 1753.

A spreading annual 10 to 20 cm. tall, with bushy spikes 2 to 4 cm. long and 1 to 2 cm. wide; awns 2 to 3 cm. long.

Waste places, introduced from Europe, whence originally described.

PERU: Matucana, *Macbride & Featherstone* 221; *Rose* 18644.

3. Hordeum muticum Presl, Rel. Haenk. 1: 327. 1830.

Hordeum andicola Griseb. Abh. Ges. Wiss. Göttingen **24**: 285. 1879.

Hordeum chilense* var. *muticum Hauman, Anal. Mus. Nac. Buenos Aires **28**: 273. 1916. Hauman gives the synonymy of several species of *Hordeum*. See also Thellung, Viertlj. Nat. Ges. Zurich **64**: 715. 1919.

An erect or prostrate perennial, mostly 20 to 40 cm. tall, with narrow flat blades and slender, dense, often purple spikes 2 to 5 cm. long, the awns mostly not exceeding the acuminate fertile floret.

Open ground Peru to Argentina and Chile. Originally described from Huánuco, Peru. (*Haenke.*)

PERU: Cerro de Pasco, *Hitchcock* 22224, 22261. Atocsaico Ranch, *McKenzie* in 1924. Juliaca, *Harlan* in 1914. Occa Pampa, *Shepard* 58.

BOLIVIA: La Paz, *Buchtien* 862; *Holway* 474, 495. *Rusby* 8, 54, 179. Palca, *Hitchcock* 22566; *Pflanz* in 1910. Tupiza, *Hitchcock* 22924. Oploca, *Hitchcock* 22887. Achacache, *Mandon* 1379. (Kew Herb.).

4. Hordeum nodosum L. Sp. Pl. ed. 2. 126. 1762.

Hordeum secalinum Schreb. Spic. Fl. Lips. 148. 1771.

Similar to *H. muticum* but with longer awns.

Fields and open ground, temperate regions; introduced from Europe, whence originally described.

ECUADOR: Pifo, *Mille* 200.

BOLIVIA: La Paz, *Pearce* in 1868 (Kew Herb.).

5. Hordeum halophilum Griseb. Abh. Ges. Wiss. Göttingen **19**: 249. 1874.

A cespitose perennial, with the aspect of *H. muticum* and *H. nodosum*, but with awns about 1 cm. long.

Cliffs and open ground, Peru to Argentina. Originally described from Catamarca, Argentina.

PERU: Río Blanco, *Macbride & Featherstone* 751.

BOLIVIA: La Paz, *Buchtien* 506.

6. Hordeum comosum Presl, Rel. Haenk. 1: 327. 1830.

An erect or spreading perennial 20 to 40 cm. tall, with bristly spikes 3 to 5 cm. long, the awns 2 to 3 cm. long; continuation of the rachilla prominent.

Open ground, Chile and Argentina; Ecuador. Originally described from Chile.

ECUADOR: Ibarra, *Mille* 260.

32. LOLIUM L. RYEGRASS

Spikelets several-flowered, solitary and sessile, placed edgewise to the continuous rachis, one edge fitting to the alternate concavities, the rachilla disarticulating above the glumes and between the florets; first glume wanting (except on the terminal spikelet), the second outward, strongly 3 to 5-nerved, equaling or exceeding the second floret; lemmas rounded on the back, 5 to 7-nerved, obtuse, acute, or awned.

Plants annual; glume 1 to 1.5 cm. long, mostly longer than the remainder of the spikelet ..... 1. L. temulentum.
Plants perennial; glume less than 1 cm. long, mostly shorter than the remainder of the spikelet.
  Lemmas awnless ..... 2. L. perenne.
  Lemmas awned ..... 3. L. multiflorum.

1. Lolium temulentum L. Sp. Pl. 83. 1753. DARNEL.

An erect annual as much as 1 meter tall, with flat blades and stiff spikes as much as 25 cm. long; lemmas awned.

Fields and waste places in temperate regions; introduced from Europe, whence originally described.

ECUADOR: Huigra, *Rose* 24021.
PERU: Lima, *Hitchcock* 22426.
BOLIVIA: La Paz, *Buchtien* 237.

1a. Lolium temulentum arvense (With.) Bab. Man. Brit. Bot. 377. 1843.

Lolium arvense With. Bot. Arr. Veg. Brit. ed. 3. 2: 168. 1796.

Differing in having awnless lemmas.

Fields and waste places; introduced from Europe, whence originally described.

ECUADOR: Between Oña and Cuenca, *Hitchcock* 21602.
PERU: Cuzco, *Hitchcock* 22472.
BOLIVIA: Cochabamba, *Hitchcock* 22837. Sorata, *Mandon* 1377 (Kew Herb.)

2. Lolium perenne L. Sp. Pl. 83. 1753. PERENNIAL RYEGRASS.

An erect or spreading, tufted perennial 20 to 40 cm. tall, with flat blades and slender spikes 5 to 15 cm. long, the lemmas awnless.

Grassland in temperate regions; introduced from Europe, whence originally described.

BOLIVIA: La Paz, *Hitchcock* 22575; *Buchtien* 4487.

3. Lolium multiflorum Lam. Fl. Franc. 3: 621. 1778. ITALIAN RYEGRASS.

Lolium italicum A. Br. Flora 17: 241. 1834.

Lolium scabrum Presl, Rel. Haenk. 1: 267. 1830. (Described from the mountains of Peru, but the type specimen at the German University, Prague, is labeled "Luzon," *Haenke*.)

Differing from *L. perenne* in having awned lemmas, the awn about as long as the lemma.

Grassland of temperate regions; introduced from Europe, whence originally described.

BOLIVIA: La Paz, *Asplund* 6462.

33. PARIANA Aubl.

Spikelets in opposite clusters of 3 at each joint of a readily disarticulating rachis, forming a spike, the center spikelet of the cluster pistillate, the other 2 staminate; stamens numerous.—A genus of doubtful affinity, placed tentatively in Hordeae.

Sheaths naked ..... 1. P. zingiberina.
Sheaths long-fimbriate at summit ..... 2. P. lunata.

1. Pariana zingiberina Doell in Mart. Fl. Bras. **2**: 337. 1877.

An erect broad-leaved perennial, with the aspect of ginger, with one vegetative and one fertile culm, the vegetative culm 50 to 80 cm. tall, naked below, bearing several oblong-elliptic blades 12 to 15 cm. long, 3 to 5 cm. wide, the lower 1 or 2 smaller; fertile culm naked, shorter than the sterile one, bearing a single terminal dense spike 5 to 8 cm. long, somewhat resembling beardless wheat.

Floor of rain forest, Venezuela to Brazil. Originally described from Brazil.

PERU: La Merced, *Macbride* 5475 (Field Mus.).

BOLIVIA: Zongo, *Bang* 847a. Mapiri, *Rusby* 232. San Buena Ventura, *Cárdenas* (*Mulford Biol. Expl.*) 1889.

2. Pariana lunata Nees, Agrost. Bras. 295. 1829.

Blades oblong-lanceolate, 15 to 20 cm. long, 4 to 5 cm. wide, asymmetrically cuneate at base; sheaths sparsely papillose-roughened, the summit with densely fimbriate auricles, the hairs 1 cm. long.

Sterile shoots frequent on shady banks near Bella Vista appear to be this species.

Guiana to Brazil. Originally described from Brazil.

PERU: Yanano, *Macbride* 3779 (sterile).

BOLIVIA: Bella Vista, *Hitchcock* 22758 (sterile).

34. DISSANTHELIUM Trin.

Spikelets small, mostly 2-flowered; glumes equal, longer than the obtuse or acutish awnless 3-nerved lemmas.

Plants annual; panicles oblong, rather narrow ..... 1. D. minimum.
Plants perennial; panicles oval.
  Glumes about 3 mm. long ..... 2. D. calycinum.
  Glumes 5 to 6 mm. long ..... 3. D. peruvianum.

1. Dissanthelium minimum Pilger, Bot. Jahrb. Engler **56**: Beibl. **123**: 28. 1920.

Vilfa macusaniensis Steud.; Lechl. Berb. Amer. Austr. 56. 1857, name only. (*Lechler* 1836.)

Graminastrum (§ *Fussia*) *macusaniense* Krause, Beih. Bot. Centralbl. **32**: 348. 1914.

An erect annual 2 to 10 cm. tall, usually growing in tufts, panicle 1 to 2 cm. long, dense, oblong; glumes acute; lemmas acute or mucronate.

Open ground on punas and alpine slopes, Peru and Bolivia. Originally described from Peru. (Type, *Weberbauer* 5451.)

PERU: Cerro de Pasco, *Hitchcock* 22240. Viso, *Macbride & Featherstone* 628. Between Pisco and Ayacucho, *Weberbauer* 5451. Chicla, *Ball* in 1882 (Kew Herb.).

BOLIVIA: Sorata, *Mandon* 1346. La Paz, *Buchtien* 6420. Challapata, *Asplund* 6477. Copacabana, *Asplund* 6499. Potosí, *D'Orbigny* 136. Without locality (presumably Macusani), *Lechler* 1836.

2. Dissanthelium calycinum (Presl) Hitchc. Journ. Washington Acad. Sci. 13: 224. 1923.

Brizopyrum calycinum Presl, Rel. Haenk. 1: 281. 1830.

Dissanthelium supinum Trin. Linnaea 10: 305. 1836. (Cerro de Pasco, *Pöppig.*)

Deschampsia mathewsii Ball, Journ. Linn. Soc. Bot. 22: 60. 1885. (Casapalta, Peruvian Andes, *Mathews.*)

A low, densely cespitose perennial, with culms mostly less than 10 cm. tall, folded or involute blades, and ovoid, dense or finally somewhat open panicles 1 to 3 cm. long; glumes 2.5 to 3.5 mm. long.

Punas and alpine slopes, Peru and Bolivia. Original locality not known, but probably Peru. (*Haenke.*)

PERU: Cerro de Pasco, *Hitchcock* 22228, 22233, 22242, 22246. Hacienda Atocsaico, *Hitchcock* 22203, 22204, 22207, 22214. Casa Cancha, *Wilkes Expl. Exped.* Huarón, *Macbride & Featherstone* 1153. Huánuco, *Macbride & Featherstone* 2183. Yauli, *Macbride & Featherstone* 933. Particalla Pass, *Cook & Gilbert* 1297, 1305. Casapalta, *Ball* in 1882 (Kew Herb.). Macusani, *Lechler* 1832 (Kew Herb.).

BOLIVIA: Rinconada, *Hitchcock* 22596½; *Asplund* 6464. La Paz, *Buchtien* 1197; *Asplund* 6481. General Campero, *Asplund* 6505. Potosí, *D'Orbigny* 186, 191. "Bolivian Plateau," *Bang* 1873. Sorata, *Mandon* 1292 (Kew Herb.).

3. Dissanthelium peruvianum (Nees & Mey.) Pilger, Bot. Jahrb. Engler 37: 378. 1906.

Phalaridium peruvianum Nees & Mey. Nov. Act. Acad. Caes. Leop. Carol. 19: Suppl. 1: 29. 1841; 161. 1843.

Differing from *D. calycinum* in having larger spikelets, about 5 mm. long. Our specimens referred to this species are more loosely cespitose.

Rocky slopes or cliffs, Peru and Bolivia. Originally described from Lake Titicaca, Peru. (*Meyen.*)

PERU: Huarón, *Macbride & Featherstone* 1155.

BOLIVIA: Sorata, *Mandon* 1345. Chacaltaya, *Buchtien* 1194.

35. KOELERIA Pers.

Spikelets 2 to 4-flowered, glumes unequal, slightly shorter than the florets; lemmas awned (in our species).

Plants perennial ..... 1. K. cristata.
Plants annual ..... 2. K. trachyantha.

1. Koeleria cristata (L.) Pers. Syn. Pl. 1: 97. 1805.

Aira cristata L. Sp. Pl. 63. 1753.

An erect cespitose perennial 30 to 50 cm. tall, with flat, mostly basal blades, and dense spikelike panicles 5 to 10 cm. long, often interrupted toward the base.

Plains, prairies, and grassy slopes in the temperate parts of both hemispheres, in South America extending north in the mountains to Peru. Originally described from Europe.

PERU: Oroya, *Hitchcock* 22184. Yanahuanca, *Macbride & Featherstone* 1280a.

BOLIVIA: Palca, *Buchtien* 2524; *Hitchcock* 22564. La Paz, *Buchtien* 6418, 6469, 6470. Lake Titicaca, *Asplund* 6492. Pongo, *Hitchcock* 22767. Sorata, *Mandon* 1359 (Kew Herb.). Without locality, *Bang* 2589½.

The specimens here cited are more or less pubescent and have slender short straight awns just below the apex of some of the lemmas. This form has been described as *K. bergii* Hieron.[20]

[20] Bol. Acad. Cienc. Córdoba 3: 376. 1881.

2. Koeleria trachyantha R. A. Phil. Fl. Atac. 55. 1860.

An erect slender annual as much as 40 cm. tall, with flat blades and spikelike, somewhat interrupted panicles 2 to 5 cm. long.

Sand hills, northern Chile and southern Peru. Originally described from Atacama, Chile.

PERU: Mollendo, *Hitchcock* 22423. San Gallán Island, *Murphy* 3477. Chorillos, *Macbride* 5871. Without locality, *Maclean* (Kew Herb.).

The sandy hills back of Mollendo are ordinarily a desert waste, but after the occasional showers they support a vigorous vegetation for a short period, The specimens cited from Mollendo were collected November 17 at one of these periods. The species was common, growing between other plants on the upper slopes of the hills.

36. TRISETUM Pers.

Spikelets with 2 or 3 perfect florets; glumes usually unequal; lemmas bidentate, bearing a slender dorsal awn.

Panicle narrow but rather loose and somewhat nodding.

Lemmas smooth, nearly terete, the nerves obscure; awn attached about the middle of the lemma ..... 1. T. deyeuxioides.

Lemmas scabrous and somewhat roughened or wrinkled, compressed, the nerves evident; awn attached about one-fourth below the tip of the lemma. ..... 2. T. scabriflorum.

Panicle dense and spikelike.

Glumes attenuate-pointed, 1 cm. long ..... 3. T. floribundum.

Glumes acute or acuminate, not attenuate, less than 1 cm. long.

Glumes about equal in size and shape, 8 mm. long ..... 4. T. macbridei.

Glumes unequal, 4 to 5 mm. long, the first shorter and narrower than the second.

Panicles 5 to 12 cm. long, often lobed or interrupted, mostly 8 to 10 times longer than wide, green or tawny ..... 5. T. spicatum.

Panicles oval or oblong, dense, 2 to 3 cm. long, about half as wide, bronze or brown-purple ..... 6. T. andinum.

1. Trisetum deyeuxioides (H. B. K.) Kunth, Rév. Gram. 1: 102. 1829.

Avena deyeuxioides H. B. K. Nov. Gen. & Sp. 1: 147. 1816.

A lax perennial about 1 meter tall, with flat blades and narrow, rather open or interrupted, nodding panicles 10 to 20 cm. long.

Moist grassland and open woods at medium altitudes, Mexico, whence originally described, to Ecuador.

ECUADOR: Huigra, *Hitchcock* 20759.

2. Trisetum scabriflorum Hitchc., sp. nov.

A lax perennial; culms more or less decumbent or spreading, glabrous, 60 to 120 cm. tall; sheaths pubescent or the upper ones glabrous; ligule thin, 1 to 2 mm. long; blades flat, sparsely pilose on both surfaces, mostly 2 to 3 mm. wide; panicle narrow, somewhat loose and interrupted, nodding, greenish or purplish, 15 to 20 cm. long, the branches ascending, rather lax, some of them floriferous to base, the longer as much as 5 cm. long, the axis glabrous; spikelets 2 or 3-flowered, 5 to 8 mm. long, the florets extending above the glumes, the rachilla joints long-pilose, 1 to 2 mm. long; glumes scabrous on the keels, mostly on the upper half, or toward the apex only, the first rather narrow, acuminate, 1-nerved, 4 to 5 mm. long, the second broader and rather abruptly acuminate, 3-nerved, 5 to 6 mm. long; lemmas compressed, lanceolate, slightly toothed, obscurely 5-nerved, scabrous all over the back and somewhat wrinkled

or roughened, the lower 5 to 6 mm. long, the others a little shorter, the callus hairs about 0.5 mm. long; awn inserted one-third below the apex, loosely twisted and flexuous for about 2 mm., the terminal part spreading, 5 to 7 mm. long; palea a little shorter than the lemma.

Type in the U. S. National Herbarium, no. 531631, collected below Pitayó, Río Palo Basin, Tierra Adentro, State of Cauca, Colombia, altitude 2,400 meters, February, 1906, by H. Pittier (no. 1435).

Open woods and grassy slopes, at 2,000 to 4,000 meters, Panama to Ecuador.

PANAMA: Chiriquí Volcano, *Hitchcock* 8209, 8221, 8224.

COLOMBIA: Las Escaleratas, Moras Valley, Río Paez Basin, Tierra Adentro, *Pittier* 1353. Pitayó, *Pittier* 1435.

ECUADOR: Tulcán, *Hitchcock* 20958, 21040. Quito, *Arcade* 20.

This species is allied to *T. fournieranum* Hitchc., of Mexico, which has smaller spikelets, and differs in numerous details.

3. Trisetum floribundum Pilger, Bot. Jahrb. Engler **37:** 505. 1906.

Trisetum weberbaueri Pilger, Bot. Jahrb. Engler **37:** 506. 1906. (*Weberbauer* 3078.)

Bromus mandonianus Henr. Repert. Nov. Sp. Fedde **23:** 177. 1926. (*Mandon* 1321.)

A densely cespitose perennial 10 to 30 cm. tall, with short involute blades and dense oval panicles 2 to 6 cm. long.

Rocky slopes, at high altitudes, Peru and Bolivia. Originally described from Peru. (Type, *Weberbauer* 1028.)

PERU: Between Culnai and Obrajillo, *Wilkes Expl. Exped.* Casapalca, *Macbride & Featherstone* 851. Huarón, *Macbride & Featherstone* 1130. Araranca, Prov. Sandía, *Weberbauer* 1028. Ocros, *Weberbauer* 2811. Caraz, *Weberbauer* 3078.

BOLIVIA: Sorata, *Mandon* 1371. Comanche, *Asplund* 6507.

4. Trisetum macbridei Hitchc., sp. nov.

Perennial; culms cespitose, erect, glabrous, 20 to 40 cm. tall; leaves mostly basal; sheaths puberulent or the upper glabrate, loose or slightly inflated; ligule membranaceous, pubescent, 1 to 2 mm. long, or the uppermost as much as 5 mm.; blades flat, puberulent, especially the lower, mostly less than 10 cm. long, the uppermost 4 to 5 cm. long, mostly 4 to 6 mm. wide; panicle dense, spikelike, interrupted below, purplish, shining, long-exserted, 7 to 8 cm. long, the axis glabrous below, scaberulous above; spikelets 2-flowered, about 8 mm. long, the pedicels scaberulous; glumes longer than the florets, equal in length and width, rather broad, glabrous even on the keel, shining, 1-nerved; rachilla between florets about 1 mm. long, sparsely pilose with hairs about 1 mm. long, continued above the second floret about 1 mm.; lemmas minutely scaberulous, the first 5 mm., the second 4 mm. long, the apex acute, slightly 2-toothed, the callus somewhat hispid with hairs about 0.5 mm. long; awn from above the middle of the lemma, loosely twisted and flexuous for about 2 mm., geniculate, the terminal straight part 3 to 4 mm. long; palea about 3 mm. long, obtuse, minutely ciliate on the keels.

Type in the U. S. National Herbarium, no. 1,161,510, collected on rocky northeastern slope, altitude 4,200 meters, at Huarón, Peru, June 12, 1922, by Macbride and Featherstone (no. 1131). No other specimen has been seen.

This species is allied to *T. spicatum*, which differs in the smaller spikelets, dissimilar glumes, awn-pointed lemmas, and the longer palea.

5. Trisetum spicatum (L.) Richt. Pl. Eur. **1:** 59. 1890.

Aira spicata L. Sp. Pl. 64. 1753.

Trisetum toluccense Kunth, Rév. Gram. **1:** 101. 297. *pl. 60.* 1829.

An erect, cespitose, glabrous or puberulent perennial 10 to 30 cm. tall, rarely as much as 1 meter tall, with flat, mostly basal blades and a dense or somewhat interrupted, spikelike panicle.

Mountain meadows and slopes, widely distributed in arctic, antarctic, and alpine regions; in South America from Colombia to southern Chile. Originally described from Europe.

ECUADOR: Vicinity of Quito, *Arcade* 19; *Harteman*, 7, 11; *Jameson; Sodiro; Mille* 268. Urbina, *Hitchcock* 22029. Without locality, *Spruce* 5934, 5935 (both Kew Herb.).

PERU: San Gallán Island, *Murphy* 3481. Baños, *Wilkes Expl. Exped.* Goyllarisquisca, *Hitchcock* 22294, 22323. Cerro de Pasco, *Hitchcock* 22254. La Quinhua, *Hitchcock* 22269, 22271. Hacienda Atocsaico, *Hitchcock* 22199. Oroya, *Hitchcock* 22184⅓. Ollantaytambo, *Hitchcock* 22535. Cuzco, *Hitchcock* 22471, 22480.

BOLIVIA: La Paz, *Hitchcock* 22563; *Buchtien* 6468; *Holway* 478. Unduavi *Buchtien* 2587. Challapata, *Asplund* 6476. La Cumbre, *Asplund* 6497.

6. Trisetum andinum Benth. Pl. Hartw. 261. 1847.

Aspect of *T. spicatum*, but the dense and spikelike panicle oval or oblong, mostly 2 to 3 cm. long, 1.5 to 2 cm. broad; whole plant canescently puberulent.

Alpine slopes, Ecuador. Originally described from Antisana. (Type, *Hartweg* 1449.)

ECUADOR: Mount Pichincha, *Hitchcock* 21059; *Holmgren* 553; *Jameson; Couthouy* in 1855 (Columbia Coll.); *André* 3907 (Kew Herb.). Hacienda Antisana, *Hartweg* 1449.

This species is allied to *Trisetum spicatum*. The cited specimens all coming from one region, though differing only slightly, appear to represent a distinct species.

37. AVENA L. OAT

Spikelets large, 2 to 4-flowered; glumes equal, many-nerved, papery, exceeding the florets; lemmas bidentate, bearing a dorsal awn, the awn sometimes rudimentary.

Lemmas 5 to 6 mm. long ..... 1. A. scabrivalvis.
Lemmas more than 1 cm. long.
  Teeth of lemma awned ..... 4. A. barbata.
  Teeth of lemma acute or acuminate but not awned.
    Glumes 3 cm. long; awn 5 to 6 cm. long ..... 5. A. sterilis.
    Glumes 2 to 2.5 cm. long; awn about 3 cm. long (sometimes reduced or wanting in *A. sativa*).
      Lemmas strongly pilose ..... 2. A. fatua.
      Lemmas glabrous ..... 3. A. sativa.

1. Avena scabrivalvis Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. **2**[1]: 28. 1836.
Bromus holciformis Steud. & Hochst.; Steud. Syn. Pl. Glum. **1**: 324. 1854.

An erect perennial 30 to 50 cm. tall, with flat blades and open few-flowered panicles with spikelets about 12 mm. long.

Open ground, Chile, whence originally described, to Argentina and Peru.

PERU: Occa Pampa, *Shepard* 57.

BOLIVIA: La Paz, *Buchtien* 6422.

2. Avena fatua L. Sp. Pl. 80. 1753. WILD OAT.

A rather stout annual with long flat blades and large open panicles of large nodding spikelets.

Occasional in waste places; introduced from Europe, whence originally described.

BOLIVIA: Cochabamba, *Hitchcock* 22836.

3. Avena sativa L. Sp. Pl. 79, 1753. CULTIVATED OAT.

Differing from *A. fatua* chiefly in the glabrous florets.

Occasionally cultivated and sometimes found in waste places. Originally described from Europe.

ECUADOR: Quito, *Arcade* 10.

4. Avena barbata Brot. Fl. Lusit. 1: 108. 1804.

Differing from *A. fatua* in the somewhat smaller spikelets, in the slender teeth of the lemma, and in the flexuous pedicels.

Waste ground; introduced from Europe, whence originally described.

PERU: Matucana, *Macbride & Featherstone* 136.

BOLIVIA: Palca, *Pflanz* 2541.

5. Avena sterilis L. Sp. Pl. ed. 2. 118. 1762. ANIMATED OAT.

Differing from *A. fatua* in the larger spikelets and stouter longer awn; glumes 3 cm. long; awn about 2 cm. long below bend, about 4 cm. long above bend.

Waste ground, introduced from Europe, whence originally described.

PERU: Mito, *Macbride* 3428, Cuzco, *Hitchcock* 22454, 22496.

38. AIRA L.

Spikelets 2-flowered, the rachilla prolonged behind the upper floret; glumes equal; lemmas thin, truncate, 2 to 4-toothed or lobed, bearing a slender awn from or below the middle.

1. Aira conferta (Pilger) Hitchc.

Trisetum confertum Pilger, Bot. Jahrb. Engler 25: 714. 1898.

A slender perennial, 50 to 100 cm. tall, with glabrous sheaths, flat lax scabrous blades 2 to 3 mm. wide, sometimes pubescent on the upper surface, and narrow, rather dense or spikelike panicles about 15 cm. long; glumes about 5 mm. long; lemmas nearly terete, glabrous, 3 mm. long, the callus densely short-pilose, the apex 2-lobed, the lobes about 0.5 mm. long, broad and rounded; awn inserted a little below the middle, erect and twisted for about 2 mm. then geniculate spreading, the terminal part 3 to 4 mm. long.

Moist soil, Ecuador to Bolivia. Originally described from Ecuador. (Type, *Stübel* 152.)

ECUADOR: Prov. Imbabura, near Loma de Canaballa, *Stübel* 152.

BOLIVIA: Cochabamba, *Hitchcock* 22814.

39. ASPRIS Adans.

Spikelets 2-flowered, the rachilla not prolonged; glumes about equal; lemmas firm, bearing on the rounded back a slender, geniculate, twisted, usually exserted awn.

1. Aspris capillaris (Host) Hitchc. U. S. Dept. Agr. Bull. 772: 116. 1920.

Aira capillaris Host, Icon. Gram. Austr. 4: 20. *pl.* 35. 1809.

A delicate spreading branching annual as much as 30 cm. tall, with divaricately branched panicles, the spikelets about 2 mm. long on capillary spreading pedicels 3 to 5 mm. long; both florets awned.[21]

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[21] According to Ascherson and Graebner (Syn. Mitteleur. Fl. 2: 279. 1899) the form with both florets awned is *Aira capillaris* var. *ambigua* (DeNot.) Aschers.

Introduced occasionally in various parts of America. Originally described from Europe.

ECUADOR: Quito, *Sodiro* in 1890; *Mille* 270.

40. WEINGAERTNERIA Bernh.

Differing from *Aspris* in the prolongation of the rachilla behind the palea, and in the club-shaped awn with a circle of short stiff hairs at the point of articulation.

1. Weingaertneria canescens (L.) Bernh. Syst. Verz. Pflanz. 51. 1800.

Aira canescens L. Sp. Pl. 65. 1753.

An erect branched perennial, with slender culms 30 to 40 cm. tall, and narrow panicles 5 to 10 cm. long.

Occasional in waste places, introduced from Europe, whence originally described.

ECUADOR: Quito, *Sodiro; Mille* 269.

41. NOTHOLCUS Nash

Spikelets 2-flowered; glumes equal, exceeding the florets; lower floret perfect, awnless, the upper staminate, bearing a hooklike dorsal awn.

1. Notholcus lanatus (L.) Nash; Hitchc. in Jepson, Fl. Calif. 1: 126. 1912.

VELVET GRASS.

Holcus lanatus L. Sp. Pl. 1048. 1753.

Perennial, 0.5 to 1 meter tall, grayish-velvety throughout, the pale, rather densely flowered, narrow panicle usually 8 to 10 cm. long.

A European grass that has occasionally escaped from cultivation at higher altitudes.

ECUADOR: Between Malchinguí and Pomasqui, *Hitchcock* 20905. Ambato, *Tate* 546. Baños, *Tate* 599. Quito, *Harteman* 48.

BOLIVIA: La Paz, *Bang* 155.

42. DANTHONIA Lam. & DC.

Spikelets several-flowered; glumes subequal, exceeding all the florets; lemmas bifid, with a twisted awn between the teeth; awn flat, formed by the extension of the 3 middle nerves of the lemma.

1. Danthonia secundiflora Presl, Rel. Haenk. 1: 255. 1830.

Danthonia montana Doell in Mart. Fl. Bras. 2^3: 101. 1878.

Danthonia montevidensis Hack. & Arech. Anal. Mus. Nac. Montevideo 1: 369. 1896.

An erect cespitose perennial 30 to 60 cm. tall, with loosely involute blades and narrow, rather few-flowered, purple panicles 5 to 8 cm. long; teeth of lemma ending in long slender awns.

Grassy paramos, Brazil to Venezuela and Ecuador. Originally described from Peru. (*Haenke.*)

ECUADOR: Between San Lucas and Oña, *Hitchcock* 21524, 21530.

PERU: Without locality, *Haenke* (a fragment from the type at the German University, Prague).

43. LAMPROTHYRSUS Pilger

Spikelets several-flowered, pilose, the florets disarticulating at the base of the rachilla joint, the rachilla long-villous; lemmas 2-toothed; awn from between teeth of lemma, slender, slightly twisted, widely spreading, the teeth of the lemma extending into long delicate awns; panicle large and many-flowered.

The genus *Lamprothyrsus* was originally described as dioecious, only the pistillate form being known. An examination of the spikelets shows the presence of small anthers. The flowers are perfect but cleistogamous.

Lamprothyrsus is related on the one hand to *Danthonia*, as shown by the long-awned teeth of the lemma and the twisted spreading awn; and on the other to *Cortaderia*, which it resembles in habit, in the large panicles, and in the disarticulation of the rachilla.

Lemma 4 mm. long to curve of nearly straight awn_____1. L. peruvianus.
Lemma 3 mm. long to curve of flexuous awn_____2. L. hieronymi.

1. Lamprothyrsus peruvianus Hitchc. Proc. Biol. Soc. Washington **36**: 195. 1923.

A robust, densely tufted perennial 1 to 2 meters tall, with long involute blades and rather dense, many-flowered, purple panicles 10 to 40 cm. long and 5 to 8 cm. wide. The old sheaths at the base flatten out, becoming spirally coiled and flexuous.

Rocky slopes and canyons, Peru to Ecuador. Originally described from Peru. (Type, *Macbride & Featherstone* 1205.)

ECUADOR: Between Loja and San Lucas, *Hitchcock* 21478.

PERU: Goyllarisquisca, *Hitchcock* 22302, 22303, 22304. Between Tarma and La Merced, *Hitchcock* 22141, 22146. Torontoy, *Cook & Gilbert* 1189. Yanahuanca, *Macbride & Featherstone* 1205.

2. Lamprothyrsus hieronymi (Kuntze) Pilger, Bot. Jahrb. Engler **37**: 58. 1906.

Triraphis hieronymi Kuntze, Rev. Gen. Pl. **3**: 373. 1898.

Lamprothyrsus hieronymi var. *pyramidatus* Pilger, Bot. Jahrb. Engler **37**: 59. 1906. (*Fiebrig* 2372.)

Lamprothyrsus hieronymi var. *tinctus* Pilger, Bot. Jahrb. Engler **37**: 59. 1906. (*Fiebrig* 2099.)

Danthonia hieronymi Hack.; Stuck. Anal. Mus. Nac. Buenos Aires **13**: 484. 1906.

Differing from *L. peruvianus* in being taller and stouter and in having a more open pale panicle, the florets smaller, the awns loosely twisted.

Rocky slopes and canyons, Argentina to Bolivia. Originally described from Argentina.

BOLIVIA: Cochabamba, *Hitchcock* 22826, 22856. Sorata, *Mandon* 1360. Bermejo, *Fiebrig* 2099.

44. CALAMAGROSTIS Adans.

Spikelets 1-flowered, the rachilla prolonged behind the palea as a short, commonly hairy bristle; glumes about equal, acute or acuminate; lemma usually shorter and more delicate than the glumes, usually awned, the awn dorsal; callus pilose, the hairs few and short or as long as the lemma.

The central Andean species of *Calamagrostis* (*Deyeuxia*) were studied by Weddell.[22] His paper consists of a key to species and an aphabetical list of the species with the specimens assigned to them. There are no formal descriptions. Until the type specimens have been examined the following species of *Deyeuxia* proposed by Weddell must remain uncertain:

D. ANTHOXANTHUM (Bolivia, *Weddell*).

D. BREVIARISTATA (Peru, *Weddell*).

D. CAPITATA (Bolivia, *D'Orbigny* 178; *Weddell*).

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[22] Conspectus analyticus specierium generis (s. sectionis) Deyeuxia in regione Andina hucusque obviarum. Bull. Soc. Bot. France **22**: 176–180. 1875.

D. CEPHALOTES (Bolivia, *Weddell*).
D. FESTUCOIDES (Bolivia, *Weddell*).
D. GRACILIS (Bolivia, *Weddell*).
Calamagrostis gracilis Henr. Med. Rijks Herb. Leiden 40: 61. 1921. Not *C. gracilis* Seenus, 1805.
D. LAGURUS (Bolivia, *D'Orbigny* 200; *Weddell*).
D. LEIOPODA (Bolivia, *Weddell*).
Stylagrostis leiopoda Mez, Bot. Archiv Mez 1: 20. 1922.
D. LONGIARISTATA (Bolivia, *Mandon* 1298).
Calamagrostis longiaristata Hack.; Sodiro, Anal. Univ. Quito 8. 1889.
D. MUTICA (Bolivia, *D'Orbigny* 182).
D. NEMATOPHYLLA (Bolivia, *Mandon* 1300).
D. OBTUSATA (Bolivia, *Mandon* 1311).
D. PICTA (Bolivia, *Mandon* 1297).
D. POLYSTACHYA (Peru, *Weddell*).
Stylagrostis polystachya Mez, Bot. Archiv Mez 1: 20. 1922.
D. SCABRIUSCULA (Peru, *Weddell*).
D. SETIFLORA (Bolivia, *Weddell*).
D. SPRUCEANA (Ecuador, *Jameson*).
Calamagrostis spruceana Hack.; Sodiro, Anal. Univ. Quito 8. 1889.
D. SUBSIMILIS (Bolivia, *Weddell*).
D. SULCATA (Bolivia, *Mandon* 1308 bis).
D. TRICHODONTA (Peru, *Weddell*).

Panicles open, the spreading capillary branches (at least the lower) naked 2 to 5 cm. at base (sometimes less or ascending in *C. eminens*). Plants 70 cm. or more tall.
Blades flat; panicle drooping ..... 1. C. leiophylla.
Blades involute; panicle erect or nearly so.
Spikelets subglomerate at the ends of the branchlets; panicles golden bronze. 2. C. eminens.
Spikelets not crowded in clusters; panicles pale or dark, not golden-bronze.
Spikelets 2.5 to 3 mm. long.
Awn scarcely exceeding the glumes; rachilla hairs white ... 3. C. lilloi.
Awn obsolete ..... 4. C. calderillensis.
Spikelets 4 to 5 mm. long.
Callus hairs copious ..... 5. C. effusa.
Callus hairs scant ..... 6. C. amoena.
Panicles narrow, the ascending branches spikelet-bearing from near the base (one of a fascicle of branches sometimes naked at base).
Blades flat, lax, 3 to 8 mm. wide. Hairs of callus or rachilla about as long as the floret.
Callus hairs short, scant. Rachilla hairs copious ..... 7. C. planifolia.
Callus with copious long hairs.
Rachilla pubescent, inconspicuous; awn inserted about 0.5 mm. below apex of lemma; lemma shorter than glumes ... 8. C. montevidensis.
Rachilla with long hairs at apex; awn inserted about the middle of the lemma; lemma about as long as the glumes ..... 9. C. beyrichiana.
Blades involute or folded or, if flat, not more than 2 mm. wide (culm blades rarely wider in *C. heterophylla* but basal blades involute).
Blades of basal innovations involute-filiform, those of the culm flat or loosely involute, all soft, lax. Lemma aristate-toothed; hairs inconspicuous ..... 10. C. heterophylla.

Blades all alike.

Sheaths with erect auricles 1 cm. or more long, hyaline at summit; floret raised on a stipe (rachilla joint), this usually disarticulating at the summit and remaining in the glumes_____11. C. podophora.

Sheaths not long-auricled; floret sessile.

Rachilla glabrous, very short. Callus hairs less than 0.5 mm. long; dwarf cespitose plants. (See also *C. bogotensis* with obscurely pubescent rachilla.)

Culms mostly less than 10 cm. tall; panicles 1 to 2 cm. long; blades mostly less than 3 cm. long; awn attached about one-fourth above the base of the lemma_____12. C. preslii.

Culms 10 to 30 cm. tall; panicles 3 to 8 cm. long; blades mostly 5 to 10 cm. long; awn attached about the middle of the lemma. 13. C. rigescens.

Rachilla more or less hairy, often long-villous (obscurely in *C. vicunarum* and allies and in *C. bogotensis.*)

Callus hairs prominent, when as short as 1 mm. the rachilla hairs scant.

Awn exserted, bent, twisted below the bend.

Hairs on rachilla prominent, reaching to about 3 mm.; blades pubescent_____14. C. mollis.

Hairs on rachilla scant, reaching to about 1 mm.; blades glabrous. 15. C. coarctata.

Awn straight or somewhat bent (if bent, shorter than the lemmas).

Panicles about 15 cm. long, rather loose. Awn bent, shorter than the lemma; callus hairs about 2 mm. long, rachilla 1 mm. long, the rather scant hairs extending to 2 mm.; glumes 5 mm. long_____16. C. haenkeana.

Panicles short and dense, or in *C. ligulata* as much as 6 cm. long.

Rachilla 2 mm. long, copiously hairy on the sides to the summit, the hairs not extending upward from the summit; lemma 3 mm. long; panicle 6 cm. long, narrow but less dense than in the next subdivision, some of the pedicels longer than the spikelets_____17. C. ligulata.

Rachilla 1 mm. long, the hairs from the summit extending upward 1 to 2 mm., those on the sides shorter or none; lemma 4 to 5 mm. long; panicle dense, oblong or ovate, the pedicels shorter than the spikelets.

Panicle oblong, 5 to 10 cm. long; scaberulous; rachilla naked below summit_____18. C. chrysantha.

Panicles oval or ovate, 2 to 4 cm. long; blades on innovations glabrous, on culm slightly scaberulous; rachilla villous below summit, the hairs shorter than those of the summit. 19. C. ovata.

Callus hairs scant or obsolete, if as much as 1 mm. long the rachilla hairs prominent.

Rachilla short, its hairs scant, usually not more than about 1 mm. long.

Plants mostly more than 0.5 meter tall; panicle 10 to 15 cm. long; glumes 4 mm. long_____20. C. bogotensis.

Plants mostly less than 20 cm. tall; panicles 2 to 4 cm. long; glumes 5 to 6 mm. long_____21. C. vicunarum.

Rachilla and its usually copious hairs reaching to 2 mm. or more.
Lemma scaberulous.
Awn attached less than 1 mm. above base of lemma. Glumes 4 mm. long; blades elongate filiform__22. C. trichophylla.
Awn attached more than 1 mm. from base of lemma.
Hairs on rachilla rather scant, the rachilla and hairs less than 3 mm. long. Panicle narrow, rather compact; palea about equaling lemma_____23. C. recta.
Hairs on rachilla copious, the rachilla and hairs usually 2 to 3 mm. long.
Panicle 2 to 3 cm. long, dense, ovoid____24. C. spicigera.
Panicle mostly more than 10 cm. long.
Panicle narrow, pale, rather compact, 10 to 20 cm. long.
Involute blades firm and stiff, 1 mm. thick.
25. C. rigida.
Involute blades rather soft and flexuous, 0.5 mm. thick.
26. C. cryptolopha.
Panicle somewhat open, purplish.
Blades glabrous_____27. C. macrophylla.
Blades scabrous.
Spikelets 5 to 6 mm. long; plants often more than 1 meter tall; panicles mostly 20 to 30 cm. long.
28. C. humboldtiana.
Spikelets 7 mm. long; plants about 30 cm. tall; panicles mostly less than 10 cm. long.
29. C. glacialis.
Lemma glabrous.
Pedicels villous. Panicle dense, ovoid; plants 10 to 20 cm. tall.
30. C. jamesoni.
Pedicels glabrous or scabrous.
Panicle dense, spikelike, sometimes interrupted at base.
Panicle 1 to 2 cm. long.
Panicle narrow, 3 to 4 times longer than wide.
31. C. curvula.
Panicle ovoid or globular, about 1 cm. long.
Lemma, glumes, and rachilla hairs about 4 mm. long.
32. C. cephalantha.
Lemma 3 to 4 mm. long; glumes 5 to 6 mm. long; rachilla hairs scant, shorter than the lemma.
33. C. curta.
Panicle more than 3 cm. long, usually more than 5 cm., often elongate.
Rachilla hairs, lemma, and glumes all about 5 mm. long.
34. C. densiflora.
Rachilla hairs and lemma shorter than the glumes.
Summit of lemma toothed; rachilla hairs about as long as lemma_____35. C. brevifolia.
Summit of lemma not toothed; rachilla hairs shorter than the lemma_____36. C. fuscata.
Panicles narrow but somewhat open.
Panicles mostly less than 5 cm. long, rather loosely few-flowered_____37. C. violacea.

Panicles mostly more than 5 cm. long.
Rachilla hairs shorter than lemma___38. C. tarmensis.
Rachilla hairs copious, about as long as the lemma.
Blades glabrous_____39. C. fiebrigii.
Blades scabrous.
Blades erect, firm, nearly as long as culms.
40. C. antoniana.
Blades slender, flexuous, shorter than the culms.
41. C. orbignyana.

1. Calamagrostis leiophylla (Wedd.) Hitchc.

Deyeuxia leiophylla Wedd. Bull. Soc. Bot. France **22**: 177, 180. 1875.

Calamagrostis toluccensis var. *laxiflora* Kuntze, Rev. Gen. Pl. **3**²: 345. 1898. (Tunari Mountains, *Kuntze.*)

An erect cespitose perennial 50 to 100 cm. tall, with flat or loosely involute, elongate, glabrous blades, and pale, narrow, rather loose panicles about 20 cm. long; glumes 7 to 8 mm. long; lemma 5 mm. long, the callus glabrous or nearly so; rachilla with its long hairs about 3 mm. long.

Known only from Bolivia. (Type, *Mandon* 1299.)

BOLIVIA: Sorata, *Mandon* 1299. Cochabamba, *Holway* 379.

2. Calamagrostis eminens (Presl) Steud. Nom. Bot. ed. 2. **1**: 250. 1840.

Deyeuxia eminens Presl, Rel. Haenk. **1**: 250. 1830.

Deyeuxia elegans Wedd. Bull. Soc. Bot. France **22**: 177, 179. 1875. (*Mandon* 1309, 1310.)

Calamagrostis eminens γ *tunariensis* Kuntze, Rev. Gen. Pl. **3**²: 344. 1898. (Tunari, 4,000 meters, *Kuntze.*)

Calamagrostis eminens δ *sordida* Kuntze, Rev. Gen. Pl. **3**²: 344. 1898. (Tunari, 3,600 meters, *Kuntze.*)

Calamagrostis elegans Henr. Med. Rijks. Herb. Leiden **40**: 61. 1921.

Stylagrostis eminens Mez, Bot. Archiv Mez **1**: 20. 1922.

Stylagrostis elegans Mez, Bot. Archiv Mez **1**: 20. 1922.

A stout erect cespitose perennial about 1 meter tall with long, more or less involute, scabrous blades and beautiful bronze-yellow open nodding panicles 15 to 30 cm. long, the spikelets in glomerules at the ends of the branchlets; glumes about 4 mm. long.

Springy or boggy places, Peru to Bolivia. Originally described from Huánuco, Peru. (*Haenke.*)

PERU: Goyllarisquisca, *Hitchcock* 22332. Hacienda Atocsaico, *Hitchcock* 22221. Huáraz, *Macbride & Featherstone* 2500. Huarón, *Macbride & Featherstone* 1134.

BOLIVIA: Sorata, *Mandon* 1309, 1310. Llavetal, *Herzog* 2080. Tunari, 4,000 meters, *Kuntze* in 1892 (N. Y. Bot. Gard.), 3,600 meters (N. Y. Bot. Gard.).

3. Calamagrostis lilloi Hack.; Stuck. Anal. Mus. Nac. Buenos Aires **13**: 477. 1906.

An erect pale cespitose perennial about 1 meter tall, with slender folded scaberulous blades and open panicles 20 to 30 cm. long, the branchlets and pedicels capillary, flexuous, the spikelets scarcely 3 mm. long.

Rocky slopes, Bolivia and Argentina. Originally described from Tucumán, Argentina.

BOLIVIA: Cochabamba, *Hitchcock* 22838.

4. Calamagrostis calderillensis Pilger, Bot. Jahrb. Engler **42**: 72. 1908.

A tall perennial, with flat or loosely convolute blades and open panicles about 15 cm. long; glumes about 4 mm. long; lemma 3 mm. long, minutely scaberulous,

awnless; callus hairs scant, 1 mm. long; rachilla less than 1 mm. long, the hairs rather short and scant; palea scaberulous, nearly as long as lemma.

Known only from the type collection.

BOLIVIA: Calderillo, southern Bolivia, *Fiebrig* 3172.

5. **Calamagrostis effusa** (H. B. K.) Steud. Nom. Bot. ed. 2. 1: 250. 1840.

Deyeuxia effusa H. B. K. Nov. Gen. & Sp. 1: 146. 1816.

Deyeuxia areantha Pilger, Bot. Jahrb. Engler 25: 711. 1898.

Calamagrostis areantha Pilger, Bot. Jahrb. Engler 42: 60. 1908.

A stout cespitose perennial up to 1 meter tall, with firm, folded or loosely involute blades and open, rather diffuse panicles as much as 20 cm. long; glumes 3 to 4 mm. long.

Paramos, Colombia to Ecuador. Originally described from Antisana and Saraguru, Ecuador. (*Bonpland.*)

ECUADOR: Tulcán, *Hitchcock* 20916.

6. **Calamagrostis amoena** (Pilger) Pilger, Bot. Jahrb. Engler 42: 60. 1908.

Deyeuxia amoena Pilger, Bot. Jahrb. Engler 27: 28. 1899. (*Bang* 805.)

Deyeuxia filifolia Wedd. Bull. Soc. Bot. France 22: 178, 179. 1875. (*Mandon* 1301, 1303, 1306.)

Calamagrostis filifolia Pilger, Bot. Jahrb. Engler 42: 67. 1908. Not *C. filifolia* Merr. 1906.

An erect cespitose perennial, with slender culms 20 to 60 cm. tall, slender erect flexuous scabrous involute blades shorter than the culms, and rather loose, purplish panicles commonly 4 to 8 cm. long; glumes 4.5 to 5 mm. long.

Dry hills, Peru and Bolivia, whence originally described. (Type, *Bang* 805.)

PERU: Abancay, *Stordy* in 1920 (Kew Herb.).

BOLIVIA: Talca Chugiaguillo, *Bang* 805. Sorata, *Mandon* 1301, 1303, 1306. Cerro Sipascoya, *Herzog* 2054. Lake Titicaca, *Asplund* 6535. Comanche, *Asplund* 6509.

Asplund's no. 6509, differing in its narrow panicles with ascending branches, is doubtfully referred to this species.

7. **Calamagrostis planifolia** (H. B. K.) Trin.; Steud. Nom. Bot. ed. 2. 1: 251. 1840.

Deyeuxia planifolia H. B. K. Nov. Gen. & Sp. 1: 145. 1816.

A lax slender perennial about 1 meter tall, with long flat blades and narrow loose nodding panicles 10 to 20 cm. long. The aspect is that of *C. montevidensis*, but the callus hairs are very short and scant and the rachilla is prominent and loose-plumose. The lower sheaths and blades are more or less pubescent.

The specimens cited are referred doubtfully to *C. planifolia*, since they do not agree in all respects with the original description which states that the ligule is elongate, the culms a foot and one-half tall, and the lemma scabrous on the back. The type, from northern Peru, has not been examined.

Open woods and moist banks, Ecuador and Peru, whence originally described. (Guangamarca, near Cajamarca, *Bonpland.*)

ECUADOR: La Rinconada Ranch, *Hitchcock* 20797. Tulcán, *Hitchcock* 20972, 21031. Between Malchinguí and Pomasqui, *Hitchcock* 20875. Between San Lucas and Oña, *Hitchcock* 21532.

8. **Calamagrostis montevidensis** Nees, Agrost. Bras. 401. 1829.

Deyeuxia alba Presl, Rel. Haenk. 1: 248. 1830. (Peru.)

Calamagrostis alba Steud. Nom. Bot. ed. 2. 1: 249. 1840.

Calamagrostis montevidensis var. *linearis* Hack. Repert. Nov. Sp. Fedde 6: 156. 1908. (*Buchtien* 430.)

A lax perennial commonly about one meter tall, with flat blades and narrow loose nodding panicles 20 to 30 cm. long; glumes acuminate, 4 mm. long; lemma shorter than the glumes, rather prominently nerved, the awn inserted about 0.5 mm. below the apex; rachilla pubescent, inconspicuous.

Moist slopes, Peru to Brazil and Argentina. Originally described from Uruguay.

PERU: Hacienda Villcabamba, *Macbride* 5152.

BOLIVIA: San Felipe, *Hitchcock* 22601. Yanacachi, *Buchtien* 431. Coroico, *Buchtien* 6430. Cochabamba, *Hitchcock* 22814½. Sorata, *Mandon* 1304 (Kew Herb.).

9. Calamagrostis beyrichiana Nees; Doell in Mart. Fl. Bras. **2**³: 53. *pl. 16*. 1878.

Calamagrostis rupestris Trin.; Doell in Mart. Fl. Bras. **2**³: 53. 1878.

Resembling *C. montevidensis;* lemma about as long as the glumes, obscurely nerved, the awn inserted about the middle; rachilla with long hairs at apex.

Moist banks and cliffs, Ecuador and Peru to Brazil, whence originally described. The types of the two species cited above have been examined.

ECUADOR: Between La Chorita and Portovelo, *Hitchcock* 21192. Between La Toma and Loja, *Hitchcock* 21385. Without locality, *André* 3483 (Kew Herb.).

PERU: Between Tarma and La Merced, *Hitchcock* 22152.

BOLIVIA: Sirupaya, *Buchtien* 430.

10. Calamagrostis heterophylla (Wedd.) Pilger, Bot. Jahrb. Engler **42**: 64. 1908.

Muhlenbergia rupestris Steud.; Lechl. Berb. Amer. Austr. 56. 1857, name only. (*Lechler* 1809.)

Deyeuxia heterophylla Wedd. Bull. Soc. Bot. France **22**: 177, 180. 1875.

Chaetotropis andina Ball, Journ. Linn. Soc. Bot. **22**: 58. 1885. (Chicla, Peru.)

Calamagrostis boliviensis Hack. Repert. Nov. Sp. Fedde **6**: 156. 1908. (*Buchtien* 866.)

Calamagrostis heterophylla var. *pubescens* Pilger, Bot. Jahrb. Engler **42**: 64. 1908. (*Weberbauer* 905.)

Calamagrostis heterophylla var. *robustior* Pilger, Bot. Jahrb. Engler **42**: 64. 1908. (*Weberbauer* 474.)

Calamagrostis calvescens Pilger, Bot. Jahrb. Engler **42**: 65. 1908. (*Weberbauer* 2842.)

A lax perennial 20 to 100 cm. tall, with flat soft blades (the basal subfiliform) and narrow, dense, interrupted, pale green or tawny panicles 5 to 15 cm. long; glumes 3 to 4 mm. long, or in exceptional specimens as much as 6 mm. long; palea with slender teeth at summit; rachilla scarcely 1 mm. long, short-pilose; callus hairs very short or sometimes as much as 1 mm. long.

Open ground and grassy slopes, Ecuador to Bolivia. Originally described from Bolivia, the specimens cited being *D'Orbigny* 202, *Weddell.*

ECUADOR: Paramos 20 kilometers west of Tulcán, alt. 3,300 meters, *Hitchcock* 20921. Open ground on wooded hills 8 kilometers south of Tulcán, alt. 2,500 meters, *Hitchcock* 21011. Between Otavalo and Malchinguí, *Hitchcock* 20827. Hills south of Quito, alt. 3,300 meters, *Harteman* 62. Mount Pichincha, *Jameson* (Kew Herb.).

PERU: Caraz, *Weberbauer* 3105. Between Samanco and Caraz, *Weberbauer* 2842. La Quinhua. *Hitchcock* 22274. Oroya, *Hitchcock* 22184, 22187. Matucana, *Macbride & Featherstone* 359, 439. Huarón, *Macbride & Featherstone* 998. Río Blanco, *Macbride & Featherstone* 652, 802. Azángaro, *Weberbauer* 474; *Lechler* 1756 (Kew Herb.). Cuyo-cuyo, *Weberbauer* 905. Goyllarisquisca, *Hitchcock* 22284. Baños, *Wilkes Expl. Exped.* Occa Pampa, *Shepard* 60. San Antonio, *Lechler* 1809. Lagunillas, *Harlan* in 1914. Juliaca, *Harlan* in 1914.

Sumbay, *Weberbauer* 6901 (Field Mus.). Paucartambo, *Weberbauer* 6915 (Field Mus.).

BOLIVIA: Sorata, *Holway* 583; *Rusby* 9 (Columbia Coll.), 201½; *Mandon* 1327 (Kew Herb.). La Paz, *Holway* 478½; *Buchtien* in 1908, 866, 3950, 6429. Potosí, *D'Orbigny* 202. Lake Titicaca, *Asplund* 6491. Chalapata, *Asplund* 6480.

The Lechler specimen from San Antonio (no. 1809) has somewhat larger spikelets and longer awns.

11. Calamagrostis podophora Pilger, Bot. Jahrb. Engler **42**: 66. 1908.

A cespitose erect perennial 40 to 60 cm. tall, with glabrous firm involute blades (the basal several, 10 to 15 cm. long, the cauline 1 or 2, 3 to 5 cm. long), membranaceous ligules 10 to 15 mm. long, and oblong open panicles 10 to 15 cm. long; glumes 5 mm. long; lemma 3 mm. long; callus hairs and rachilla hairs long.

Paramos, Colombia to Peru. Originally described from Peru. (Type, *Weberbauer* 2231.)

ECUADOR: Paramos 20 kilometers west of Tulcán, *Hitchcock* 20914.

PERU: Large bunches near bog, Cerro de Pasco, *Hitchcock* 22250 (panicles more compact). Prov. Tarma, *Weberbauer* 2231.

Pennell & Hazen 9857, 9949, from Colombia, also belong to this species.

12. Calamagrostis preslii (Kunth) Hitchc.

Agrostis caespitosa Presl, Rel. Haenk. 1: 237. 1830. Not *A. caespitosa* Salisb. 1796.

Agrostis preslii Kunth, Rév. Gram. 1: Suppl. XVII. 1830.

Bromidium caespitosum Nees, Act. Acad. Caes. Leop. Carol. **19**: Suppl. 1: 23. 1841; 155. 1843.

Bromidium hygrometricum var. *caespitosum* Kuntze, Rev. Gen. Pl. **3**²: 343. 1898.

Calamagrostis caespitosa Scribn. Rep. Mo. Bot. Gard. 10: 37. *pl. 32. f. 1, 2.* 1899. Not *C. caespitosa* Steud. 1854.

A densely cespitose dwarf tussock grass mostly less than 10 cm. tall, with short, firm, folded blades and spikelike panicles about 2 cm. long.

Rocky slopes and hills at high altitudes, Peru, whence originally described. (*Haenke.*)

PERU: Cerro de Pasco, *Hitchcock* 22236. Hacienda Atocsaico, *Hitchcock* 22198, 22200. Between Casa Cancha and Culnai, *Wilkes Expl. Exped.*

13. Calamagrostis rigescens (Presl) Scribn. Rep. Mo. Bot. Gard. **10**: 37. *pl. 32. f. 3.* 1899.

Agrostis rigescens Presl, Rel. Haenk. 1: 237. 1830.

Agrostis chamaecalamus Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. **4**¹: 119. 1841.

Bromidium spectabile Nees & Mey. Nov. Act. Acad. Caes. Leop. Carol. **19**: Suppl. 1: 24. 1841; 156. 1843. (Lake Titicaca, *Meyen.*)

Bromidium rigescens Nees, Nov. Act. Acad. Caes. Leop. Carol. **19**: Suppl. 1: 22. 1841; 154. 1843.

?*Bromidium rigescens* var. *brevifolium* Nees, Nov. Act. Acad. Caes. Leop. Carol. **19**: Suppl. 1: 22. 1841; 154. 1843. Lake Titicaca; the type has not been examined.

Chamaecalamus spectabilis Meyen, Nov. Act. Acad. Caes. Leop. Carol. **19**: Suppl. 1: 24. 1841; 156. 1843, as synonym of *Bromidium spectabile.*

Agrostis jamesoniana Steud. Syn. Pl. Glum. 1; 163. 1854. (Mount Pichincha, *Jameson.*)

Deyeuxia imberbis Wedd. Bull. Soc. Bot. France **22**: 177, 180. 1875. (Bolivia, *D'Orbigny* 218; *Weddell; Mandon* 1315, 1317.)

Agrostis bromidioides Griseb. Abh. Ges. Wiss. Göttingen **24**: 293. 1879.

Bromidium hygrometricum var. *spectabilis* Kuntze, Rev. Gen. Pl. **3**²: 342. 1898.

Bromidium hygrometricum var. *rigescens* Kuntze, Rev. Gen. Pl. **3**²: 343. 1898.

Calamagrostis cajatámbensis Pilger, Bot. Jahrb. Engler **42**: 64. 1908. (*Weberbauer* 2686.)

A cespitose usually pale perennial 10 to 20 cm. tall, with stiff involute blades and spikelike more-or-less interrupted panicles 3 to 8 cm. long; glumes 4 mm. long; awn exserted about 2 mm.; rachilla naked.

Moist soil, Ecuador to northern Argentina. Originally described from Peru. (*Haenke.*)

ECUADOR: Mount Pichincha, *Jameson* 159. Alpine region, *Jameson* 431, 798 (Kew Herb.).

PERU: Cajatambo, *Weberbauer* 2686. Goyllarisquisca, *Hitchcock* 22301. Cerro de Pasco, *Hitchcock* 22238, 22255. Hacienda Atocsaico, *Hitchcock* 22194, 22222; *McKenzie* in 1924. Río Blanco, *Macbride & Featherstone* 786. Oroya, *Hitchcock* 22140. Ayapata, *Lechler* 1981 (Kew Herb.).

BOLIVIA: La Paz, *Bang* 104; *Holway* 484; *Mandon* 1292b (Kew Herb.). Comanche, *Asplund* 6503. Achacache, *Mandon* 1317 (in part).

The specimens of *Mandon* 1317 in the U. S. National Herbarium and in the Kew Herbarium consist of two species, *C. rigescens* and *C. vicunarum*. Since Weddell distinguishes his *Deyeuxia imberbis* from his *D. vicunarum* by the characters that distinguish *C. rigescens* from *C. vicunarum*, it is probable that his own specimen of *Mandon* 1317, cited by him under *D. imberbis*, consisted of that species only.

14. Calamagrostis mollis Pilger, Bot. Jahrb. Engler **42**: 61. 1908.

A cespitose perennial 5 to 30 cm. tall, with involute pubescent blades and spikelike panicles 4 to 5 cm. long; glumes 6 mm. long; lemma 4 mm. long, the callus hairs about 1 mm. long; awn from the middle of the lemma, geniculate, exserted; palea 3 mm. long; rachilla 2 mm. long, short-pilose.

Known only from the type collection.

ECUADOR: Paramos of Mount Chimborazo, *Hans Meyer* 148.

15. Calamagrostis coarctata (H. B. K.) Steud. Nom. Bot. ed. 2. **1**: 250. 1840.

Deyeuxia coarctata H. B. K. Nov. Gen. & Sp. **1**: 143. 1816.

A densely cespitose perennial 10 to 30 cm. tall, with slender wiry long-exserted culms, numerous firm glabrous folded obtuse arcuate basal blades, mostly 5 to 10 cm. long, and spikelike panicles 2 to 6 cm. long.

Paramos of Colombia and Ecuador. Originally described from Quito. (*Bonpland.*)

ECUADOR: Mount Pichincha, *Hitchcock* 21063. Mount Chimborazo, *Hitchcock* 21955, 21999½, 22020.

16. Calamagrostis haenkeana Hitchc.

Agrostis arundinacea Presl, Rel. Haenk. **1**: 238. 1830. Not *Calamagrostis arundinacea* Roth, 1788.

Culms erect, 70 cm. tall; blades involute; panicle oblong-lanceolate, rather loose, pale, 15 cm. long; spikelets 5 mm. long; lemma a little shorter than the glumes, minutely scaberulous; awn attached below the middle, bent, exserted at the side of the glumes, shorter than the lemma.

The only specimen seen is the type in the National Museum at Prague. Presl describes it from the mountains of Huánuco, Peru, but the label has no data as to origin. It is distinct from the other Peruvian species described

herein but may be the same as some other species from another part of the world.

17. Calamagrostis ligulata (H. B. K.) Hitchc.

Deyeuxia ligulata H. B. K. Nov. Gen. & Sp. 1: 145. 1816.

Deyeuxia aurea Munro; Wedd. Bull. Soc. Bot. France 22: 176 (err. typ. 156), 179. 1875. (*Jameson*, Ecuador.)

Calamagrostis aurea Hack.; Sodiro, Anal. Univ. Quito 8. 1884. (Ecuador.).

Calamagrostis longigluma Pilger, Bot. Jahrb. Engler 42: 71. 1908. (*Hans Meyer* 144.)

Stylagrostis longigluma Mez, Bot. Archiv Mez 1: 20. 1922.

An erect cespitose perennial, with stout culms 10 to 30 cm. tall, firm stiff glabrous folded blades, membranaceous ligules 10 to 15 mm. long, and dense, ovoid or oblong, often bronze panicles 6 to 10 cm. long; glumes narrow, long-acuminate; lemma 3 mm. long, erose-truncate, the awn short or exceeding the glumes.

Stony slopes at high altitudes, Ecuador, whence originally described, the type being from near Quito. (*Bonpland.*)

Ecuador: Quito, *Jameson* 95. Mount Pichincha, snowy summit, *Jameson* 97 (N. Y. Bot. Gard.), 836, *Harteman* 84; *Couthouy* in 1855 (Columbia Coll.), *Sodiro* in 1887. Mount Chimborazo, *Hitchcock* 21968. El Altar, *Hans Meyer* 144.

18. Calamagrostis chrysantha (Presl) Steud. Nom. Bot. ed. 2. 1: 250. 1840.

Deyeuxia chrysantha Presl, Rel. Haenk. 1: 247. 1830.

Deyeuxia chrysostachya Desv. in Gay, Fl. Chil. 6: 323. 1853.

Calamagrostis mutica Steud.; Lechl. Berb. Amer. Austr. 56. 1857, name only. (*Lechler* 1965.)

Deyeuxia phalaroides Wedd. Bull. Soc. Bot. France 22: 177, 180. 1875. (Bolivia, *D'Orbigny* 197; *Mandon* 1319.)

Calamagrostis chrysostachya Kuntze, Rev. Gen. Pl. 3: 344. 1898.

Stylagrostis chrysantha Mez, Bot. Archiv Mez 1: 20. 1922.

Stylagrostis chrysostachya Mez, Bot. Archiv Mez 1: 20. 1922.

Stylagrostis phalaroides Mez, Bot. Archiv Mez 1: 20. 1922.

An erect glabrous cespitose perennial 20 to 50 cm. tall, with firm erect sharp-pointed involute blades and dense oblong golden-bronze panicles 2.5 to 5 cm. long.

Bogs at high altitudes, Peru to Bolivia and Chile. Originally described from Huánuco, Peru. (*Haenke.*)

Peru: Casapalca, *Macbride & Featherstone* 864. Ayapata, *Lechler* 1965.

Bolivia: La Paz, *Mandon* 1319.

19. Calamagrostis ovata (Presl) Steud. Nom. Bot. ed. 2. 1: 251. 1840.

Deyeuxia ovata Presl, Rel. Haenk. 1: 246. 1830.

Deyeuxia nivalis Wedd. Bull. Soc. Bot. France 22: 176 (err. typ. 156), 180. 1875. (Bolivia, *D'Orbigny* 110; *Weddell; Mandon* 1318.)

Calamagrostis pflanzii Pilger, Bot. Jahrb. Engler 49: 184. 1912. (*Pflanz* 305.)

Stylagrostis nivalis Mez, Bot. Archiv Mez 1: 20. 1922.

Stylagrostis ovata Mez, Bot. Archiv Mez 1: 20. 1922.

An erect cespitose perennial 10 to 20 cm. tall, with loose, glabrous, often inflated sheaths, flat or loosely involute blades, and dense, golden-bronze, ovoid or oblong panicles 2 to 5 cm. long, the soft attentuate glumes 10 to 12 mm. long.

Gravelly slopes at high altitudes, Peru and Bolivia. Originally described from Huánuco, Peru. (*Haenke.*)

PERU: Ayapata, *Lechler* 1827 (Kew Herb.). Baños, *Wilkes Expl. Exped.* (Kew Herb.). Tabina, *Lechler* 2057.

BOLIVIA: Sorata, *Mandon* 1320. Illimani, *Hitchcock* 22591. La Paz, *Mandon* 1318. Cerro Tunari, *Herzog* 2107. Chacaltaya, *Buchtien* 1192. Palca, *Pflanz* 305. Aiquile, Cordillera Real, *Knoche* 3.

20. Calamagrostis bogotensis (Pilger) Pilger, Bot. Jahrb. Engler **42**: 60. 1908.

Deyeuxia bogotensis Pilger, Bot. Jahrb. Engler **25**: 712. 1898.

An erect, glabrous or sometimes pubescent, cespitose perennial 60 to 100 cm. tall, with elongate, firm, involute or sometimes flat blades and narrow, rather compact, sometimes spikelike, often interrupted panicles 10 to 20 cm. long.

Paramos, Colombia to Ecuador. Originally described from Bogotá, Colombia.

ECUADOR: Paramo 20 kilometers west of Tulcán, *Hitchcock* 20920. Between Oña and Cuenca, *Hitchcock* 21652.

21. Calamagrostis vicunarum (Wedd.) Pilger, Bot. Jahrb. Engler **42**: 62. 1908.

Deyeuxia vicunarum Wedd. Bull. Soc. Bot. France **22**: 177, 180. 1875.

Calamagrostis pentapogonodes Kuntze, Rev. Gen. Pl. **3**²: 344. 1898. (Bolivia, Tunari.)

Calamagrostis vicunarum var. *abscondita* Pilger, Bot. Jahrb. Engler **42**: 63. 1908. (*Weberbauer* 312.)

Calamagrostis vicunarum var. *elatior* Pilger, Bot. Jahrb. Engler **42**: 63. 1908. (*Weberbauer* 938.)

Calamagrostis vicunarum var. *humilior* Pilger, Bot. Jahrb. Engler **42**: 62. 1908. (*Weberbauer* 954.)

Calamagrostis vicunarum var. *minima* Pilger, Bot. Jahrb. Engler **42**: 63. 1908. (*Weberbauer* 953.)

Calamagrostis vicunarum var. *setulosa* Pilger, Bot. Jahrb. Engler **42**: 63. 1908. (*Weberbauer* 943.)

Calamagrostis vicunarum var. *tenuior* Pilger, Bot. Jahrb. Engler **42**: 63. 1908. (*Weberbauer* 2782.)

A low, pale, densely cespitose perennial mostly 5 to 30 cm. tall, with slender glabrous culms, filiform, involute, flexuous or curled, scaberulous, mostly basal blades, and spikelike panicles 2 to 6 cm. long; glumes about 6 mm. long; lemma rather firm, terete, ending in 4 slender teeth, the awn from below the middle; rachilla about 1 mm. long, sparsely pilose.

Hills and slopes at high altitudes, Peru to Bolivia, whence originally described, the specimens mentioned being *D'Orbigny* 185, 187, 222; *Pentland, Weddell.*

ECUADOR: Without locality, *Spruce* (Kew Herb.).

PERU: Cerro de Pasco, *Hitchcock* 22225, 22229. Hacienda Atocsaico, *Hitchcock* 22206, 22219, 22220; *McKenzie* in 1924. Oroya, *Hitchcock* 22138, 22139; *Macbride & Featherstone* 948. Between Casa Cancha and Culnai, *Wilkes Expl. Exped.* Río Blanco, *Macbride & Featherstone* 787. Araranca, *Cook & Gilbert* 174, 183. Chuquibambilla, *Hitchcock* 22445. Huarón, *Macbride & Featherstone* 1156.

BOLIVIA: La Paz, *Asplund* 6518; *Buchtien* 26 (N. Y. Bot. Gard.). Achacache, *Mandon* 1317 (in part). Chacaltaya, *Buchtien* 159, 1200, 1202. Carangas, *D'Orbigny* 185, 222. Eucaliptus, *White* 173. La Cumbre, *Asplund* 6511, 6512.

22. Calamagrostis trichophylla Pilger, Bot. Jahrb. Engler **42**: 67. 1908.

An erect cespitose perennial 30 to 50 cm. tall, with scabrous, involute, capillary somewhat flexuous blades and narrow, rather open panicles; glumes about

4 mm. long; lemma as long as the glumes, scaberulous above, the callus hairs short and scant; awn attached near base of lemma, exserted 1 to 2 mm.; rachilla 2 mm. long, short-pilose.

Dry hills, Peru. (Type, *Weberbauer* 4873.)

PERU: Cuzco, *Weberbauer* 4873. Araranca, *Stordy* in 1920 (Kew Herb.).

23. Calamagrostis recta (H. B. K.) Trin.; Steud. Nom. Bot. ed. 2. 1: 251. 1840.

Deyeuxia recta H. B. K. Nov. Gen. & Sp. 1: 144. 1816; 7: *pl. 686*. 1825.

Deyeuxia pallens Presl, Rel. Haenk. 1: 249. 1830. (Huánuco and Guayaquil.)

Calamagrostis pallens Steud. Nom. Bot. ed. 2. 1: 251. 1840.

A rather robust, erect, closely cespitose perennial 50 to 100 cm. tall, with firm involute scabrous blades about half as long as the culms and narrow, dense, almost spikelike panicles mostly 10 to 20 cm. long.

Paramos, Ecuador and Peru. Originally described from near Quito. (*Bonpland.*)

ECUADOR: Mount Pichincha, *Hitchcock* 21085; *Couthouy* in 1855 (Columbia Coll.). Mount Antisana, *Anthony & Tate* 281; *Hartweg* 1456 (N. Y. Bot. Gard.). *Whymper* 1329 (N. Y. Bot. Gard.). Mount Chimborazo, *Hitchcock* 21980. Mount Tungurahua, *Spruce* 5927. Quito, *Jameson* 190 (Kew Herb.). Nabón, *Rose* 22994.

PERU: Goyllarisquisca, *Hitchcock* 22283, 22314, 22315, 22318. Sachapata, *Lechler* 2695, 3304 (both Kew Herb.).

24. Calamagrostis spicigera (Presl) Steud. Nom. Bot. ed. 2. 1: 251. 1840.

Deyeuxia spicigera Presl, Rel. Haenk. 1: 247. 1830.

An erect glabrous perennial 15 cm. tall, with slender involute blades and spikelike panicles about 3 cm. long; glumes 6 mm. long; lemma 5 mm. long, toothed, scaberulous, the callus hairs scarcely 1 mm. long; awn nearly straight, attached just below the middle of the lemma, equaling the glumes; rachilla 2 mm. long, densely long-pilose, the hairs widely spreading on the sides, at the end reaching about to the summit of the glumes.

Known only from the type collection.

PERU: Mountains of Huánuco, *Haenke.*

25. Calamagrostis rigida (H. B. K.) Trin.; Steud. Nom. Bot. ed. 2. 1: 251. 1840.

Deyeuxia rigida H. B. K. Nov. Gen & Sp. 1: 144. 1816.

Calamagrostis nitidula Pilger, Bot. Jahrb. Engler 42: 69. 1908. (*Weberbauer* 960.)

Calamagrostis nitidula var. *elata* Pilger, Bot. Jahrb. Engler 42: 70. 1908. (*Weberbauer* 1014.)

Calamagrostis nitidula var. *macrantha* Pilger, Bot. Jahrb. Engler 42: 70. 1908. (*Weberbauer* 1041.)

An erect cespitose pale perennial 50 cm. tall, with firm stiff involute scabrous blades 1 mm. thick and a narrow, dense, almost spikelike panicle 12 cm. long.

Stony slopes at high altitudes, Ecuador, whence originally described, and Peru.

ECUADOR: Mount Antisana, *Bonpland* (fragment from type).

PERU: Prov. Sandía, *Weberbauer* 960, 1014, 1041.

26. Calamagrostis cryptolopha (Wedd.) Hitchc.

Deyeuxia cryptolopha Wedd. Bull. Soc. Bot. France 22: 176 (err. typ. 156), 179. 1875.

A pale erect cespitose perennial 75 cm. tall, with slender involute scabrous blades and narrow, rather dense panicles 15 cm. long, the narrowly ascending branches as much as 5 cm. long; glumes 6 mm. long; lemma 5 mm. long,

scaberulous, the callus hairs short and scant; awn attached a little below the middle of the lemma, bent and exserted a little beyond the glumes; rachilla about 1.5 mm. long, with copious hairs extending to about 3 mm.

Known only from the type collection.

BOLIVIA: Sorata, *Mandon* 1313.

27. Calamagrostis macrophylla (Pilger) Pilger, Bot. Jahrb. Engler **42**: 60. 1908.

Deyeuxia macrophylla Pilger, Bot. Jahrb. Engler **25**: 711. 1898.

Differing from *C. humboldtiana* in the larger spikelets (8 to 9 mm. long) and in the glabrous blades.

Ecuador and Peru. Originally described from Ecuador. (Type, *Stübel* 34.)

ECUADOR: Mount Pichincha, *Stübel* 34.

PERU: Chinche, *Macbride & Featherstone* 1284.

28. Calamagrostis humboldtiana Steud. Nom. Bot. ed. 2. **1**: 250. 1840.

Deyeuxia stricta H. B. K. Nov. Gen. & Sp. 1: 146. 1816. Not *Calamagrostis stricta* Koel. 1802.

Deyeuxia intermedia Presl, Rel. Haenk. 1: 249. 1830. (Huánuco, Peru.)

Calamagrostis intermedia Steud. Nom. Bot. ed. 2. 1: 250. 1840.

Calamagrostis agapatea Steud.; Lechl. Berb. Amer. Austr. 56. 1857, name only. (*Lechler* 1843.)

Deyeuxia mandoniana Wedd. Bull. Soc. Bot. France **22**: 179, 180. 1875. (*Mandon* 1308.)

Deyeuxia secunda Pilger, Bot. Jahrb. Engler **25**: 712. 1898. (*Stübel* 257.)

Calamagrostis secunda Pilger, Bot. Jahrb. Engler **42**: 60. 1908.

An erect pale cespitose perennial with glabrous culms 30 to 100 cm. tall, erect scabrous involute blades, and narrow, rather loose panicles 15 to 35 cm. long; glumes about 6 mm. long; lemma 5 mm. long, scaberulous, toothed, the callus hairs short; awn bent and exserted; rachilla 2.5 to 3 mm. long, pilose with rather short hairs.

Moist grassy places, Colombia, whence originally described, to Argentina.

ECUADOR: Tulcán, *Hitchcock* 20918. Mount Chimborazo, *Hitchcock* 21949; *Sodiro* 265, 266. Mount Sangay, *Stübel* 257. Between Cuenca and Huigra, *Hitchcock* 21689. Nabón, *Rose* 22994. Between San Lucas and Oña, *Hitchcock* 21533, 21535. Without locality, *Sodiro* in 1887 and 1896; *Karsten*.

PERU: Mito, *Macbride & Featherstone* 1697, 1875. San José, *Macbride & Featherstone* 1105. Yauli, *Macbride & Featherstone* 903. Oroya, *Macbride & Featherstone* 951. Tarma, *Macbride & Featherstone* 1067. Obrajillo, *Wilkes Expl. Exped.* Goyllarisquisca, *Hitchcock* 22327. Casa Cancha, *Wilkes Expl. Exped.* Ayapata, *Lechler* 1843.

BOLIVIA: Sorata, *Mandon* 1308. Pongo, *White* 238. La Paz, *Buchtien* 2495. Palca, *Buchtien* 123 (N. Y. Bot. Gard.), 2525, 2530. Llavetal, *Herzog* 2079.

29. Calamagrostis glacialis (Wedd.) Hitchc.

Deyeuxia glacialis Wedd. Bull. Soc. Bot. France **22**: 179. 1875.

A pale, erect, densely cespitose perennial, with scabrous culms 30 to 40 cm. tall, erect scabrous firm sharp-pointed blades nearly as long as culms, and spikelike tawny-purple panicles 5 to 15 cm. long; glumes about 7 mm. long; awn about equaling the glumes; rachilla hairs long and copious.

Rocky slopes below snow line, Bolivia, whence originally described. (Type, *Mandon* 1312.)

BOLIVIA: Sorata, *Mandon* 1312. Illimani, *Hitchcock* 22590.

30. Calamagrostis jamesoni Steud. Syn. Pl. Glum. 1: 191. 1854.

Deyeuxia jamesoni Munro; Wedd. Bull. Soc. Bot. France **22**: 176 (err. typ. 156). 1875.

Deyeuxia stuebelii Pilger, Bot. Jahrb. Engler **25**: 713. 1898. (*Stübel* 231b.)
Calamagrostis stuebelii Pilger, Bot. Jahrb. Engler **42**: 60. 1908.

A low cespitose perennial 10 to 30 cm. tall, with somewhat rhizomatous base, firm glabrous involute falcate basal blades mostly 2 to 5 cm. long, and dense, ovate or oblong, bronze to purple panicles 2 to 3 cm. long; glumes ciliate on the keels; rachilla densely long-pilose.

Rocky slopes at high altitudes, Ecuador to Bolivia. Originally described from Mount Pichincha, Ecuador. (*Jameson.*)

ECUADOR: Quito, *Karsten; Sodiro* in 1887. Summit of Pichincha, *Jameson* 21. Mount Chimborazo, *Hitchcock* 21985. Mount Atacatzo, *Harteman* 69. Mount Antisana *Stübel* 231b; *Whymper* 1329 (6) (N. Y. Bot. Gard.).

BOLIVIA: Chacaltaya, *Buchtien* 1193.

The Bolivian specimen differs in having pubescent rather than villous pedicels, and glabrous glumes.

31. Calamagrostis curvula (Wedd.) Pilger, Bot. Jahrb. Engler **42**: 60. 1908.
Deyeuxia curvula Wedd. Bull. Soc. Bot. France **22**: 178, 179. 1875.
Deyeuxia tenuifolia R. A. Phil. Anal. Mus. Nac. Chile Bot. **8**: 83. 1891.
Deyeuxia variegata R. A. Phil. Anal. Mus. Nac. Chile Bot. **8**: 83. 1891.
Calamagrostis variegata Kuntze, Rev. Gen. Pl. **3**²: 345. 1898. (Tunari, Bolivia.)
Calamagrostis tenuifolia R. E. Fries, Nov. Act. Soc. Sci Upsal. IV. **1**: 177. 1905.

A dwarf perennial forming dense tussocks as much as 1 meter in diameter; culm slender, 10 to 20 cm. tall, with several involute filiform arcuate blades and spikelike panicles 1 to 4 cm. long, the glumes purple below and along the keel, with a wide, white or creamy margin.

Dry hills and slopes, Peru to Argentina and Chile. Originally described from "Pérou [now Bolivia] (d'Orb. n. 219; Wedd.)."

BOLIVIA: Atocha, in the gravelly river bed, *Hitchcock* 22873. "Andes of Bolivia," distributed by Philippi. Carangas, *D'Orbigny* 219.

The Philippi specimen, labeled *Deyeuxia tenuifolia*, and distributed by Dr. R. A. Philippi, may be from the type collection of that species.

32. Calamagrostis cephalantha Pilger, Bot. Jahrb. Engler **42**: 61. 1908.

A dwarf cespitose perennial, with slender culms as much as 15 cm. tall or reduced to a few centimeters, short pubescent folded blades, and ovoid, densely flowered panicles 1 to 2 cm. long; glumes 6 mm. long.

Alpine slopes, Peru and Bolivia. (Type, *Weberbauer* 1003.)

PERU: Between Poto, Peru, and Suches, Bolivia, *Weberbauer* 1003. Between Casa Cancha and Culnai, *Wilkes Expl. Exped.*

BOLIVIA: Chacaltaya, near La Paz, *Buchtien* 1195, 1205.

33. Calamagrostis curta (Wedd.) Hitchc.
Deyeuxia curta Wedd. Bull. Soc. Bot. France **22**: 176 (err. typ. 156), 179. 1875.

A dwarf cespitose perennial less than 15 cm. tall, with short, firm, flat or folded blades and a dense, ovoid, purple and bronze panicle 1 to 2 cm. long.

Rocky slopes at high altitudes, Bolivia. (Type, *Mandon* 1316.)

BOLIVIA: La Cumbre, *Asplund* 6516. Sorata, *Mandon* 1316.

34. Calamagrostis densiflora (Presl) Steud. Nom. Bot. ed. 2. **1**: 250. 1840.
Deyeuxia densiflora Presl, Rel. Haenk. **1**: 247. 1830.

Resembling *C. humboldtiana*; differing in having panicles on the average shorter and denser, and a shorter long-villous rachilla, the hairs copious and as long as the lemma.

Rocky ledges, Peru. (Type from Huánuco, *Haenke.*)

PERU: Hacienda Atocsaico, *Hitchcock* 22223. Oroya, *Hitchcock* 22136, 22137.

35. Calamagrostis brevifolia (Presl) Steud. Nom. Bot. ed. 2. 1: 249. 1840.

Deyeuxia brevifolia Presl, Rel. Haenk. 1: 248. 1830.

A cespitose perennial 20 to 40 cm. tall, with a dense cushion of curly foliage at the base, the slender involute glabrous blades much shorter than the culms, and spikelike, bronze to purple panicles 3 to 8 cm. long.

Alpine slopes, Peru and Bolivia. Originally described from Huánuco. (*Haenke.*)

PERU: Cerro de Pasco, *Hitchcock* 22253. La Quinhua, *Hitchcock* 22275. Hacienda Atocsaico, *Hitchcock* 22192, 22209; *McKenzie* in 1924. Río Blanco, *Macbride & Featherstone* 785. Casa Cancha, *Wilkes Expl. Exped.*

BOLIVIA: La Paz, *Asplund* 6519.

36. Calamagrostis fuscata (Presl) Steud. Nom. Bot. ed. 2. 1: 250. 1840.

Deyeuxia fuscata Presl, Rel. Haenk. 1: 249. 1830.

A cespitose perennial 20 to 40 cm. tall, with numerous slender involute smooth blades nearly as long as the culm and narrow but scarcely spikelike panicles 5 to 10 cm. long.

Alpine slopes, Peru. Originally described from Huánuco. (*Haenke.*)

PERU: Goyllarisquisca, *Hitchcock* 22305. Mito, *Macbride* 3322, 3364. Tabina, *Lechler* 2142 (Kew Herb.).

37. Calamagrostis violacea (Wedd.) Hitchc.

Deyeuxia violacea Wedd. Bull. Soc. Bot. France 22: 179, 180. 1875.

A cespitose perennial 10 to 30 cm. tall, with slender wiry culms, firm, involute, flexuous, mostly basal blades, and rather open, purple panicles 2 to 4 cm. long; anthers 2 mm. long.

Rocky slopes, Peru to Bolivia. Originally described from Bolivia. (*Weddell.*)

PERU: Lagunillas, *Harlan* in 1914. Sumbay, *Weberbauer* 6898, 6900, 6904 (all Field Mus.). Carumas, *Weberbauer* 7317.

BOLIVIA: Achacache, *Mandon* 1307. Huayna-Potosí, *Germann* 51. La Paz, *Buchtien* 6428. Comanche, *Asplund* 6506. Palca, *Buchtien* 2529. Rinconada, *Asplund* 6463. La Cumbre, *Asplund* 6493. Chalapata, *Asplund* 6517. Chacaltaya, *Buchtien* 1199. General Campero, *Asplund* 6520.

38. Calamagrostis tarmensis Pilger, Bot. Jahrb. Engler 42: 70. 1908.

Calamagrostis tarijensis Pilger, Bot. Jahrb. Engler 42: 71. 1908. (*Fiebrig* 3119 and 3120.)

Calamagrostis rosea var. *macrochaeta* Hack. in Fries, Ark. för Bot. 8: 40. 1908. (*Fries* 1301.)

An erect slender cespitose perennial 40 to 80 cm. tall, with slender, elongate, rather soft, flat or loosely involute blades and narrow, rather loose panicles 10 to 15 cm. long.

Rocky slopes, Peru and Bolivia. Originally described from Peru. (Type, *Weberbauer* 2460.)

ECUADOR: Between Oña and Cuenca, *Hitchcock* 21654. Tungurahua, *Sodiro* in 1901.

PERU: Palca, *Weberbauer* 2460. La Quinhua, *Hitchcock* 22273.

BOLIVIA: Tarija, *Fiebrig* 3119, 3120; *Fries* 1301 (spikelets smaller than in the *Fiebrig* specimens, the lemma 3 mm. long.)

39. Calamagrostis fiebrigii Pilger, Bot. Jahrb. Engler 42: 68. 1908.

An erect cespitose perennial 20 to 30 cm. tall, with erect, involute, glabrous, rather soft blades, thin ligules 3 to 4 mm. long, and narrow, rather dense, purplish panicles 2 to 4 cm. long.

Known only from the type collection.

BOLIVIA: Puna Patanca, southern Bolivia, *Fiebrig* 3191.

40. Calamagrostis antoniana (Griseb.) Steud.

Calamagrostis antoniana Steud.; Lechl. Berb. Amer. Austr. 56. 1857, name only. (*Lechler* 1800.)

Agrostis antoniana Griseb. Abh. Ges. Wiss. Göttingen **24**: 293. 1879. (*Lechler* 1800.)

Calamagrostis sandiensis Pilger, Bot. Jahrb. Engler **42**: 68. 1908. (*Weberbauer* 906.)

An erect pale cespitose perennial 30 to 60 cm. tall, with long stiff involute scabrous sharp-pointed blades and narrow, rather loose panicles 10 to 15 cm. long.

Dry slopes among shrubs, Peru, whence originally described, to Bolivia. (Type, *Lechler* 1800.)

PERU: San Antonio, *Lechler* 1800. Cuyo-cuyo, *Weberbauer* 906. Casapalta, *Ball* in 1882 (Gray Herb.).

BOLIVIA: La Cumbre, *Asplund* 6514.

41. Calamagrostis orbignyana (Wedd.) Hitchc.

Deyeuxia orbignyana Wedd. Bull. Soc. Bot. France **22**: 178, 180. 1875.

An erect pale cespitose perennial 30 to 80 cm. tall, with slender flexuous involute blades usually much shorter than the culms, and pale, narrow, rather loose panicles 10 to 20 cm. long; glumes 5 to 6 mm. long; lemma about 4 mm. long, the awn attached below the middle; callus hairs about 1 mm. long; rachilla with its copious hairs extending beyond the lemma.

Moist grassy places, Bolivia to Argentina. Originally described from Bolivia (*D'Orbigny* 217.)

BOLIVIA: La Paz, *Buchtien* 501, 6472; *Pflanz* in 1910. Chalapata, *Asplund* 6532. Pasña, *Asplund* 6475. Uyuni, *Asplund* 6484.

The following varieties have not been identified:

BROMIDIUM HYGROMETRICUM VAR. BREVIARISTATUM Kuntze, Rev. Gen. Pl. 3^2: 342. 1898. Tunari Mountains, Bolivia. This is near *Calamagrostis rigescens*.

CALAMAGROSTIS TOLUCCENSIS α DENSIFLORA Kuntze, Rev. Gen. Pl. 3^2: 345. 1898. Cochabamba, Bolivia.

45. AGROSTIS L. BENTGRASS

Spikelets 1-flowered; glumes equal, acute or acuminate; lemma delicate, usually shorter than the glumes, awnless or dorsally awned; palea usually minute or wanting.

Palea evident, usually about half as long as the lemma.

Lemma awned.

Panicle diffuse, pale; palea about half as long as the lemma.

1. A. sodiroana.

Panicle narrow, somewhat open, purple; palea one-third as long as the lemma **2. A. gelida.**

Lemma awnless.

Rachilla prolonged behind the palea; lemma as long as the glumes; spikelets 1 mm. long **3. A. trichodes.**

Rachilla not prolonged; lemma shorter than the glumes; spikelets 2 to 3 mm. long.

Panicle somewhat open and spreading **4. A. stolonifera.**

Panicle dense, more or less lobed or interrupted **5. A. verticillata.**

Palea minute or wanting.
Panicle open, the spikelets not crowded. Blades flat.
Panicle diffuse, the spikelets all long-pediceled. Lemma awned.
6. A. montevidensis.
Panicle open but not diffuse, some of the spikelets rather short-pediceled.
Lemmas awnless ---------- **7. A. perennans.**
Lemmas awned ---------- **8. A. boliviana.**
Panicle narrow, more or less condensed.
Panicles spikelike, mostly less than 5 cm. long and 0.5 cm. thick. Low alpine plants.
Lemma awned ---------- **9. A. haenkeana.**
Lemma awnless ---------- **10. A. breviculmis.**
Panicles more than 5 cm. long, spikelike or somewhat open.
Glumes very scabrous over the back. Lemma awned; panicle open, the branches naked below, densely spikelet-bearing above.
11. A. exasperata.
Glumes glabrous on back (scabrous on the keel) or sometimes slightly scaberulous.
Blades firm, stiff, upright, flat, with a sharp involute point.
12. A. nigritella.
Blades laxer, not stiff, upright and sharp-pointed.
Spikelets about 3 mm. long, mostly purple; lemma 2 mm. long; panicles rather loose ---------- **13. A. araucana.**
Spikelets about 2 mm. long, mostly green; lemma 1.5 mm. long; panicles condensed but more or less interrupted.
14. A. tolucensis.

1. Agrostis sodiroana Hack. Oesterr. Bot. Zeitschr. **52**: 61. 1902.

A slender perennial, with lax culms about 50 cm. long, flat blades 2 to 4 mm. wide, and few-flowered loose drooping panicles, the branches spikelet-bearing toward the ends.

Thickets, Ecuador. Known only from the type collection.

ECUADOR: Mount Pichincha, *Sodiro* in 1887.

2. Agrostis gelida Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. **4**[1]: 343. 1841.

A loosely cespitose, rather lush perennial, with flat blades and rather narrow, loose panicles with verticillate branches; glumes about 3 mm. long; lemma 1.5 mm. long, the awn bent and short-exserted.

Boggy slopes, Peru to Bolivia. Originally described from "Pasco," Peru. (*Pöppig.*)

PERU: Huánuco, *Macbride & Featherstone* 2180. Tambillo, *Macbride* 3584. Goyllarisquisca, *Hitchcock* 22331. Mito, *Macbride & Featherstone* 1847. Ollantaytambo, *Hitchcock* 22533.

BOLIVIA: Pongo, *Hitchcock* 22781. Unduavi, *Buchtien* 841.

3. Agrostis trichodes (H. B. K.) Roem. & Schult. Syst. Veg. **2**: 361. 1817.

Vilfa trichodes H. B. K. Nov. Gen. & Sp. **1**: 139. 1816.

Agrostis bogotensis Hack. Repert. Nov. Sp. Fedde **8**: 518. 1910.

A delicate cespitose perennial, with slender culms 10 to 20 cm. tall, slender, soft, involute, mostly basal blades, and delicate oval open panicles 2 to 5 cm. long; glumes broad, equal, 1 mm. long, divergent after the fall of the floret; lemma obtuse, equaling the glumes and like them in texture; rachilla prolonged as a slender bristle behind the palea.

Paramos, Venezuela, Colombia, and Peru. Originally described from Peru, "Crescit in crepidinibus Andium Peruvianum justa Montan, Santa Cruz et

Guambos, alt. 1350 hexap." (*Bonpland.*) Doctor Lecomte kindly sent a fragment from the type specimen in Paris.

ECUADOR: Santa Rosa de Cañar, *Rose* 22662.

PERU: Andes, northern Peru, *Bonpland.*

The following specimens also belong to this species.

VENEZUELA: Mérida, Páramo de la Sol, 3,400 meters, *Jahn* 524a; Sierra Nevada, *Funck & Schlim* 1630. COLOMBIA: Bogotá, *Apollinaire* in 1908 (type of *A. bogotensis*); *Apollinaire & Arthur* 21; *MacDonall* in 1915.

4. Agrostis stolonifera L. Sp. Pl. 62. 1753.

A spreading perennial, with erect culms from a creeping base, flat blades, and narrow loose panicles; spikelets awnless, the palea well developed.

A native of Europe, whence originally described; introduced at various places in America in cool climates.

ECUADOR: Mount Pichincha, *Sodiro; Harteman* 6.

BOLIVIA: Pongo, *Hitchcock* 22784.

4a. Agrostis stolonifera maritima (Lam.) Koch, Syn. Deutsch. Schweiz. Fl. 781. 1837.

Agrostis maritima Lam. Encycl. **1**: 61. 1783.

Panicle contracted, almost spikelike. A native of Europe.

PERU: Arequipa, *Günther* 13.

5. Agrostis verticillata Vill. Prosp. Pl. Dauph. 16. 1779.

A decumbent or spreading perennial, with culms 20 to 40 cm. or even as much as 1 meter long, flat blades, and dense, more or less interrupted or lobed panicles 5 to 10 cm. or sometimes 15 cm. long.

In water and wet places, especially along irrigating ditches, southern United States to Argentina; native ir the Old World. Originally described from France.

PERU: Lima, *Hitchcock* 22337½. Goyllarisquisca, *Hitchcock* 22296. Arequipa, *Hitchcock* 22437.

BOLIVIA: La Paz, *Rusby* 40. Cochabamba, *Hitchcock* 22808, 22848; *Buchtien* 2519.

6. Agrostis montevidensis Spreng.; Nees, Agrost. Bras. 403. 1829.

An erect slender tufted perennial 20 cm. tall, with narrow short flat blades and diffuse panicle, the capillary branches widely spreading, the spikelets long-pediceled; spikelets 2 mm. long; lemma awned; palea wanting.

Grassy plains, Brazil to Argentina and Bolivia. Originally described from Uruguay.

BOLIVIA: Gucachaca, *Cárdenas* (*Mulford Biol. Expl.*) 36 S. Tarija, *Fiebrig* 2907 (Kew Herb.).

7. Agrostis perennans (Walt.) Tuckerm. Amer. Journ. Sci. **45**: 44. 1843.

Cornucopiae perennans Walt. Fl. Carol. 74. 1788.

Vilfa elegans H. B. K. Nov. Gen. & Sp. **1**: 139. 1816. (Quito.)

Vilfa fasciculata H. B. K. Nov. Gen. & Sp. **1**: 139. 1816. (Quito.)

Agrostis elegans Roem. & Schult. Syst. Veg. **2**: 362. 1817. Not *A. elegans* Salisb. 1796.

Agrostis fasciculata Roem. & Schult. Syst. Veg. **2**: 362. 1817.

Agrostis pulchella Kunth, Rév. Gram. **1**: Suppl. XVII. 1830. Not *A. pulchella* Loisel. 1824.

Agrostis humboldtiana Steud. Nom. Bot. ed. 2. **1**: 40. 1840.

Agrostis weberbaueri Mez, Repert. Nov. Sp. Fedde **18**: 1. 1922. (Huacapistana and Monsón, Peru, *Weberbauer.*)

A lax, often decumbent perennial 40 to 80 cm. tall, with flat blades and narrow, rather diffuse panicles 10 to 20 cm. long, the capillary branches verticillate; spikelets awnless, the palea none.

Moist shady banks, Ecuador to Bolivia. Originally described from South Carolina.

ECUADOR: La Rinconada Ranch, *Hitchcock* 20800. Quito, *Mille* 250, 251, 253; *Harteman* 70; *Sodiro*. Between Oña and Cuenca, *Hitchcock* 21631, 21647. Between San Lucas and Oña, *Hitchcock* 21534. Between Loja and San Lucas, *Hitchcock* 21466. Between La Toma and Loia, *Hitchcock* 21380. Tungurahua, *Spruce* 5926.

PERU: Tambo de Vaca, *Macbride* 4396. Goyllarisquisca, *Hitchcock* 22330. Dept. Huánuco, *Weberbauer* 3719. Sachapata, *Lechler* 2640a (Kew Herb.).

BOLIVIA: Bella Vista, *Hitchcock* 22757. Unduavi, *Buchtien* 2585, 6427. La Paz, *Buchtien* 6426.

The original description of *Vilfa elegans* states that the palea equals the lemma, but in the type in the Paris Herbarium the palea is obsolete.

8. Agrostis boliviana Mez, Repert. Nov. Sp. Fedde **18**: 1. 1922.

Similar to *A. gelida* but with a looser panicle and laxer habit; lemma awned; palea wanting. Differing from *A. perennans* in the awned lemmas.

Known only from the two Fiebrig collections, cited with the original description.

BOLIVIA: Pinos bei Tarija, alt. 3,000 meters, *Fiebrig* 2821. Calderillo, alt. 3,200 meters, *Fiebrig* 2905. (Both in Kew Herb.).

9. Agrostis haenkeana Hitchc.

Agrostis mucronata Presl, Rel. Haenk. **1**: 238. 1830. Not *A. mucronata* Spreng. 1825.

Agrostis nana var. *andicola* Pilger, Bot. Jahrb. Engler **37**: 505. 1906. (*Hans Meyer* 145, 146.)

A densely cespitose, spreading or erect perennial 5 to 30 cm. tall, with short, erect, narrow, flat or involute, mostly basal blades, and spikelike panicles 3 to 7 cm. long; glumes 2 mm. long; lemma awned; palea minute or wanting.

Rocky slopes at high altitudes, Ecuador to Bolivia. Original locality not stated, probably Peru. (*Haenke.*)

ECUADOR: Mount Pichincha, *Hitchcock* 21082. Mount Chimborazo, *Hans Meyer* 145, 146. Mount Azuay, *Spruce* 6097 (Kew Herb.).

PERU: Hacienda Atoscaico, *Hitchcock* 22202. Sachapata, *Lechler* 2604 (Kew Herb.).

BOLIVIA: Sorata, *Mandon* 1291, 1314 (Kew Herb.). Pongo, *Hitchcock* 22764; *Asplund* 6467. Chacaltaya, *Buchtien* 1204. La Cumbre, *Asplund* 6496. Lake Titicaca, *Asplund* 6490. Unduavi, *Buchtien* 4278. Without locality, *Bang* 2589; *Mandon* 1292.

10. Agrostis breviculmis Hitchc. U. S. Dept. Agr. Bur. Pl. Ind. Bull. **68**: 36. *pl. 18*. 1905.

Trichodium nanum Presl, Rel. Haenk. **1**: 243. 1830.

Agrostis nana Kunth, Rév. Gram. **1**: Suppl. XVIII. 1830. Not *A. nana* Del. 1800.

A densely cespitose, dwarf, tussock-forming perennial, with erect stiff culms mostly less than 10 cm. tall, short involute sharp-pointed blades, and spikelike panicles mostly 1 to 3 cm. long; glumes about 2 mm. long; lemma awnless; palea wanting.

Open ground and rocky slopes at high altitudes, Ecuador to Chile. Originally described from Peru. (*Haenke.*)

ECUADOR: Quito, *Rose* 24028, 23535. Between Malchinguí and Pomasquí, *Hitchcock* 20857. Mount Chimborazo, *Hitchcock* 21982, 21993, 22002; *Anthony & Tate* 366. Urbina, *Hitchcock* 22007, 22014, 22045. Between Loja and San Lucas, *Hitchcock* 21457. Without locality, *Spruce* 5936.

PERU: Goyllarisquisca, *Hitchcock* 22320. Cerro de Pasco, *Hitchcock* 22237, 22247. Baños, *Wilkes Expl. Exped.* Hacienda Atocsaico, *Hitchcock* 22205.

11. Agrostis exasperata Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 4¹: 352. 1841.

Vilfa acutiglumis Steud.; Lechl. Berb. Amer. Austr. 56. 1857, name only. (Tacna, *Lechler* 1542.)

An erect or somewhat decumbent perennial as much as 1 meter tall, with flat blades and pyramidal, rather dense panicles 10 to 15 cm. long, the lower branches naked at the base, compactly flowered; glumes acuminate or shortly aristate, very scabrous over the back, the lemma short-awned.

Swampy land, Bolivia to Chile, whence originally described.

BOLIVIA: Palca, *Buchtien* 2531. La Paz, *Rusby* 39.

12. Agrostis nigritella Pilger, Bot. Jahrb. Engler **25**: 713. 1898.

Agrostis stuebelii Pilger, Bot. Jahrb. Engler **25**: 714. 1898.

A densely cespitose, rather stout perennial 10 to 20 cm. tall, with flat or somewhat involute blades and dense, narrow, almost spikelike, dark purple panicles 5 to 10 cm. long; glumes 3 to 4 mm. long; lemma with a bent awn from below the middle; palea wanting.

Rocky slopes at high altitudes, Ecuador. Originally described from near Antisana. (Type, *Stübel* 231.)

ECUADOR: Mount Pichincha, *Hitchcock* 21053; *Karsten; Harteman* 82. Antisana, *Anthony & Tate* 284; *Stübel* 231. Mount Chimborazo, *Hitchcock* 21950. Between Oña and Cuenca, *Hitchcock* 21642.

The specimen from Oña (*Hitchcock* 21642) has a more open panicle and may represent a distinct species.

13. Agrostis araucana Phil. Anal. Univ. Chile **94**: 14. 1896.

A loosely cespitose perennial 30 to 50 cm. tall, with flat or loosely involute blades and narrow panicles 8 to 15 cm. long, the branches ascending or appressed; glumes 3 mm. long; lemma with a bent awn; palea wanting.

Moist banks, Colombia to Chile, whence originally described.

ECUADOR: Mount Pichincha, *Jameson* 693 (Kew Herb.), 229; *Sodiro* in 1889 and 1904, 252. Mount Chimborazo, *Hitchcock* 21999.

PERU: Cuzco, *Hitchcock* 22484. Mito, *Macbride & Featherstone* 1800. Goyllarisquisca, *Hitchcock* 22291. Paucartambo, *Weberbauer* 6923 (Field Mus.).

BOLIVIA: Unduavi, *Buchtien* 2581, 2586. Pongo, *Hitchcock* 22779.

14. Agrostis tolucensis H. B. K. Nov. Gen. & Sp. **1**: 135. 1816.

Agrostis virescens H. B. K. Nov. Gen. & Sp. **1**: 135. 1816.

Vilfa glomerata Presl, Rel. Haenk. **1**: 239. 1830. (Peru.)

Agrostis glomerata Kunth, Rév. Gram. **1**: Suppl. XVII. 1830.

An erect or somewhat spreading perennial 10 to 50 cm. tall, with flat or loosely involute blades and narrow, rather dense or spikelike, often interrupted panicles 5 to 20 cm. long; glumes 2 to 3 mm. long, scabrous on the keel, sometimes also sparingly on the back; awn present or wanting; palea wanting. When growing in moist woods or thickets the blades are lax and flat; when growing on high paramos the blades are stiffer and more or less involute.

Shady or open ground, Mexico, whence originally described, to Chile.

ECUADOR: Tulcán, *Hitchcock* 21021, 21045. Vicinity of Quito, *Sodiro* in 1886; *Harteman* 12, 13, 17, 30, 38, 53; *Mille* 248; *Rose* 23534, 24031; *Jameson* 302 (Kew Herb.). Otavalo to Malchinguí, *Hitchcock* 20828. Urbina, *Hitchcock* 22015, 22016. Mount Chimborazo, *Anthony & Tate* 370. Between Cuenca and Huigra, *Hitchcock* 21691. Between Oña and Cuenca, *Hitchcock* 21593, 21643. Without locality, *Spruce* 5927. Tungurahua, *Spruce* 5930 (Kew Herb.). Guayrapata, *Spruce* 5957 (Kew Herb.).

PERU: Tambo de Vaca, *Macbride* 4357. Goyllarsiquisca, *Hitchcock* 22310, 22321. Between Tarma and La Merced, *Hitchcock* 22145. La Quinhua, *Hitchcock* 22264. Ollantaytambo, *Hitchcock* 22534, 22539. Chachapoyas, *Mathews* 3240 (Kew Herb.).

BOLIVIA: Lake Titicaca, *Asplund* 6489. Pongo, *Hitchcock* 22770. San Felipe, *Hitchcock* 22600. Unduavi, *Bang* 20. Bella Vista, *Hitchcock* 22755.

46. CINNA L.

Spikelets 1-flowered, the disarticulation below the glumes, the rachilla prolonged behind the palea as a minute bristle; glumes equal; lemma about as long as the glumes, bearing a minute straight awn just below the apex.

1. Cinna poaeformis (H. B. K.) Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. **24**: 21. 1901.

Deyeuxia poaeformis H. B. K. Nov. Gen. & Sp. **1**: 146. 1816.

A rather lax perennial about 1 meter tall, with flat blades as much as 7 mm. wide, and a narrow open panicle as much as 40 cm. long, the branches ascending or spreading, naked below, rather densely flowered above; spikelets 3 mm. long; palea as long as lemma; rudiment slender, glabrous.

Shady moist places in the mountains, Mexico, whence originally described, to Peru.

PERU: Mito, *Macbride* 3365.

47. ALOPECURUS L.

Spikelets 1-flowered, disarticulating below the glumes, strongly compressed laterally; glumes equal, ciliate on the keel; lemma about as long as the glumes, awned on the back.

Panicle 2 to 3 cm. long, 8 mm. thick ..... 1. **A. bracteatus.**
Panicle 5 cm. long, 3 to 4 mm. thick ..... 2. **A. aequalis.**

1. Alopecurus bracteatus Phil. Anal. Univ. Chile **94**: 6. 1896.

An erect, smooth, somewhat succulent perennial as much as 1 meter tall, with flat blades (those of the culm inconspicuous) and oblong silky spikelike panicles; spikelets about 3 mm. long, the awn about 2 mm. long. Spikelets smaller than in *A. antarcticus* Vahl, which it resembles. *A. alpinus* J. G. Smith, of the arctic regions, has spikelets more woolly than either of these.

Bogs, Peru to Chile, whence originally described.

PERU: Huarón, *Macbride & Featherstone* 1133. Goyllarisquisca, *Hitchcock* 22334. Occa Pampa, *Shepard* 61.

BOLIVIA: La Paz, *Hitchcock* 22585; *Buchtien* 431 (Kew Herb.), 861. Unduavi, *Buchtien* 2579. Pongo, *Hitchcock* 22768. Sorata, *Mandon* 1244 (Kew Herb.).

2. Alopecurus aequalis Sobol. Fl. Petrop. 16. 1799.

Alopecurus aristulatus Michx. Fl. Bor. Amer. **1**: 43. 1803.

Alopecurus fulvus J. E. Smith in Sowerby, Engl. Bot. *pl. 1467*. 1805.

A smooth, erect or decumbent perennial 20 to 50 cm. tall, with flat blades and spikelike panicles, the awns scarcely extending beyond the spikelets; anthers orange.

In water and wet places in the cooler parts of the northern hemisphere, extending in the mountains to Argentina. Originally described from Russia.

ECUADOR: Near Quito, *Sodiro* in 1887; *Holmgren* 570.

PERU: Cerro de Pasco, *Macbride* 3078.

BOLIVIA: Sorata, *Mandon* 1243 (Kew Herb.). La Paz, *Asplund* 6567.

48. POLYPOGON Desf.

Spikelets 1-flowered, the disarticulation below the glumes; glumes equal, awned; lemma delicate, shorter than the glumes, usually awned; inflorescence narrow, interrupted or dense and spikelike.

Glumes, excluding awns, about 3 mm. long, gradually narrowed into the awn. **1. P. elongatus.**

Glumes, excluding awns, about 2 mm. long, abruptly rounded at summit. **2. P. lutosus.**

Glumes, excluding awns, about 1.5 mm. long, the awn 6 to 8 mm. long. **3. P. monspeliensis.**

1. Polypogon elongatus H. B. K. Nov. Gen. & Sp. 1: 134. 1816.

Raspailia agrostoides Presl, Rel. Haenk. 1: 239. *pl. 80.* 1830. (Peru.)

Nowodworskya agrostoides Presl, Rel. Haenk. 1: 351. 1830. (Peru.)

A lax, usually decumbent perennial as much as 1 meter tall, with flat blades and narrow, dense but interrupted, nodding panicles 10 to 20 cm. long.

Moist places, Mexico to Argentina. Originally described from Chillo, Ecuador. (*Bonpland.*)

ECUADOR: Tulcán, *Hitchcock* 21008. Between Malchinguí and Pomasqui, *Hitchcock* 20900. Quito, *Holmgren* 575; *Harteman* 32, 36, 37, 59; *Holway* 928, 958; *Jameson* in 1859, 417. Ambato, *Hitchcock* 21712. Riobamba, *Mille* 262; *Spruce* 5803 * (Kew Herb.). Huigra, *Hitchcock* 20350; *Rose* 22472, 22539. Tablón de Oña, *Rose* 23075.

PERU: Lima, *Wilkes Expl. Exped.; Hitchcock* 22340; *Mathews* 545 (Kew Herb.). Between Tarma and La Merced, *Hitchcock* 22152½. Cuzco, *Hitchcock* 22487. Arequipa, *Hitchcock* 22431, 22432.

BOLIVIA: Sorata, *Mandon* 1294. San Felipe, *Hitchcock* 22599. San José, *Hitchcock* 22735. Palca, *Hitchcock* 22569. Cotaña, *Buchtien* 3133. Cochabamba, *Hitchcock* 22813.

2. Polypogon lutosus (Poir.) Hitchc. U. S. Dept. Agr. Bull. **772:** 138. 1920.

Agrostis littoralis With. Bot. Arr. Veg. Brit. ed. 3. **2:** 129. 1796. Not *A. littoralis* Lam. 1791.

Polypogon littoralis Smith, Comp. Fl. Brit. 13. 1800.

Agrostis lutosa Poir. in Lam. Encyl. Suppl. 1: 249. 1810.

Polypogon interruptus H. B. K. Nov. Gen. & Sp. 1: 134. *pl. 44.* 1816.

A spreading perennial, with decumbent culms from a few centimeters to 1 meter long, usually rooting at the lower nodes, flat blades, and dense, more or less interrupted panicles as much as 15 cm. long.

In water or wet places. Pacific coast, Vancouver Island, southward; apparently introduced, common along irrigating ditches. Native of the Mediterranean region. Originally described from Europe.

ECUADOR: Between Malchinguí and Pomasqui, *Hitchcock* 20899. Quito, *Mille* 261; *Harteman* 51. Mount Chimborazo, *Anthony & Tate* 329, 372, 447. Rio-

bamba, *Spruce* 5803; *Mille* 65. Huigra, *Hitchcock* 20349; *Rose* 22496, 24019, 24023. Cuenca, *Rose* 22886, 22890, 24026. Quero, *Lehmann* 5284 (Kew Herb.).

PERU: Obrajillo, *Wilkes Expl. Exped.* Lima, *Hitchcock* 22337. Matucana, *Macbride & Featherstone* 377. Goyllarisquisca, *Hitchcock* 22286, 22333. La Quinhua, *Hitchcock* 22262. Oroya, *Hitchcock* 22177. Tarma, *Hitchcock* 22172. Cuzco, *Hitchcock* 22476, 22508. Arequipa, *Hitchcock* 22433; *Rose* 18790, 19009; *Meyen.*

BOLIVIA: La Paz, *Bang* 40 (Coll. Pharmacy Herb.), 47; *Buchtien* 867, 2491; *Rose* 18866; *Mandon* 1295; *Shepard* 160. Cotaña, *Buchtien* 3139. Palca, *Hitchcock* 22576; *Buchtien* 2548. Cochabamba, *Hitchcock* 22792, 22849; *Buchtien* 2518, 2520. Oploca, *Hitchcock* 22893.

3. Polypogon monspeliensis (L.) Desf. Fl. Atlant. 1: 67. 1798.

Alopecurus monspeliensis L. Sp. Pl. 61. 1753.

Polypogon flavescens Presl, Rel. Haenk. 1: 234. 1830. (Peru.)

A low spreading weedy annual, with inflated sheaths, flat blades, and dense silky-awned oblong panicles; glumes about 1.5 mm. long, hispidulous, the awn 6 to 8 mm. long from between two rounded lobes.

Waste places in warm countries. Originally described from France.

PERU: Without locality, *Haenke*, a fragment in the U. S. National Herbarium from the herbarium of the German University at Prague.

49. LYCURUS H. B. K.

Spikelets 1-flowered; glumes awned, the first usually 2-awned; lemma narrow, firm, longer than the glumes, terminating in a slender awn.

1. Lycurus phleoides H. B. K. Nov. Gen. & Sp. 1: 142. *pl. 45.* 1816.

A loosely cespitose perennial, with knotty crown, wiry decumbent culms 10 to 30 cm. long, short, crowded, flat or folded blades, and spikelike panicles 2 to 5 cm. long.

Rocky slopes and open ground, southwestern United States to Argentina, Originally described from Mexico.

PERU: Tarma, *Hitchcock* 22169.

BOLIVIA: Sorata, *Mandon* 1284. La Paz, *Buchtien* 4485. Capai, *Bang* 762. Cochabamba, *Hitchcock* 22815, 22822, 22863. Valle Grande, *Herzog* 1790.

50. PEREILEMA Presl

Perfect spikelets 1-flowered, surrounded at base by numerous sterile spikelets in the form of bristles or delicate bracts.

Lemma about 1.5 mm. long ..... 1. P. crinitum.
Lemma 2 to 3 mm. long ..... 2. P. beyrichianum.

1. Pereilema crinitum Presl, Rel. Haenk. 1: 233. *pl. 37. f. a.* 1830.

An erect annual 20 to 40 cm. tall, with flat blades and dense panicles, spikelike above, interrupted or lobed below, 5 to 15 cm. long, bristly with awns 1 to 2 cm. long; lemma about 1.5 mm. long.

Cliffs and open ground, Mexico to Venezuela and Ecuador. Originally described from Panama.

ECUADOR: Near Quito, *Jameson* 58.

2. Pereilema beyrichianum (Kunth) Hitchc.

Muhlenbergia beyrichiana Kunth, Enum. Pl. 1: 200. 1833.

Pereilema brasilianum Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat 4^1: 136. 1841; 382. 1845.

Differing from *P. crinitum* in the looser interrupted panicle, the lower branches spreading or somewhat reflexed, rather distant, 1 to 2 cm. long; sterile spikelets fewer; lemma 2 to 3 mm. long.

Moist slopes, Colombia to Ecuador and Brazil, whence originally described. ECUADOR: Huigra, *Hitchcock* 20326, 20635, 20680.

51. MUHLENBERGIA Schreb.

Spikelets 1-flowered, in close or open panicles; glumes usually shorter than the lemma; lemma firm-membranaceous, 3 to 5-nerved, with a very short, usually pilose callus, the apex acute, extending into a straight or flexuous awn or sometimes only mucronate.

Plants annual, the culms branching, delicate. Lemma bearing a delicate awn.
Glumes or some of them awned, the awn as long as the body of the glume or longer.
Panicle branches divaricate or recurved, falling entire; lemma 3 to 4 mm. long ---- 1. M. diversiglumis.
Panicle branches not falling entire. Lemma long-ciliate ---- 2. M. ciliata.
Glumes not awned, often acute or acuminate.
Second glume broad, 3-toothed; awn flexuous ---- 3. M. peruviana.
Second glume entire; awn straight.
Second glume 2 to 3 mm. long ---- 4. M. quitensis.
Second glume not over 1 mm. long.
Glumes acute or mucronate; body of lemma 1.5 mm. long. 5. M. tenuissima.
Glumes obtuse; body of lemma 2 to 3 mm. long ---- 6. M. microsperma.
Plants perennial.
Plants low and spreading, the blades less than 3 cm. long; lemma acute or cuspidate but not awned.
Blades flat; culms decumbent-spreading but without scaly rhizomes. 7. M. ligularis.
Blades involute, falcate; scaly rhizomes present ---- 8. M. fastigiata.
Plants erect or decumbent, not low and spreading; lemmas acute or awned.
Glumes unequal, 3 and 4 mm. long; blades flat, less than 5 cm. long; awn flexuous ---- 9. M. flexuosa.
Glumes equal or nearly so, 1.5 to 2 mm. long; blades more than 5 cm. long; awn, if present, straight or nearly so.
Panicle dense and spikelike, stiffly erect; glumes more than half as long as the lemma ---- 10. M. angustata.
Panicles narrow but not dense and spikelike; glumes less than half as long as the lemma.
Awn about as long as the lemma; panicle lead-colored. 11. M. holwayorum.
Awn 2 to 3 times as long as the lemma; panicle purple. 12. M. rigida.

1. **Muhlenbergia diversiglumis** Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 4[1]: 298. 1841.

A slender annual, somewhat coarser than *M. ciliata*, the branches of the few-flowered panicle with only 1 to 3 spikelets.

Cliffs and moist slopes, Mexico to Peru. Originally described from Mexico.
ECUADOR: Huigra, *Hitchcock* 20322, 20768. Latacunga, *Sodiro*.
PERU: San Miguel, *Cook & Gilbert* 958.

2. **Muhlenbergia ciliata** (H. B. K.) Kunth, Rév. Gram. 1: 63. 1829.
Podosaemum ciliatum H. B. K. Nov. Gen. & Sp. 1: 128. 1816.

A delicate, usually tufted annual 10 to 20 cm. tall, with short flat spreading blades, and narrow, densely flowered panicles one-third to half as long as the entire culm; lemmas ciliate.

Cliffs and moist banks, often on walls, Mexico to Ecuador. Originally described from Mexico.

ECUADOR: Baños, *Hitchcock* 21921.

PERU: Mito, *Macbride* 3376. Piedra Grande, *Macbride* 3684.

3. Muhlenbergia peruviana (Beauv.) Steud. Nom. Bot. ed. 2. 1: 41. 1840.

Clomena peruviana Beauv. Ess. Agrost. 28. 1812.

Muhlenbergia clomena Kunth, Rév. Gram. 1: 64. 1829.

Muhlenbergia nana Benth. Pl. Hartw. 262. 1846. (Mount Cotopaxi.)

Agrostis delicatula Steud.; Lechl. Berb. Amer. Austr. 56. 1857, name only. (*Lechler* 1813b.)

Muhlenbergia herzogiana Henr. Med. Rijks Herb. Leiden 40: 58. 1921. (*Herzog* 2226.)

A tufted, closely cespitose annual 3 to 20 cm. tall, with erect culms and blades and narrow, rather compact panicles.

Cliff walls and open ground, Mexico to Argentina. Originally described from Peru, the specimen being communicated by Thibaut.

ECUADOR: Mount Pichincha, *Mille* 249. Cotopaxi, *Sodiro* in 1891. Tigua, *Sodiro* in 1897.

PERU: Matucana, *Macbride & Featherstone* 450. Río Blanco, *Macbride & Featherstone* 800. Yauli, *Macbride & Featherstone* 916. Oroya, *Macbride & Featherstone* 984. Huánuco, *Macbride & Featherstone* 2114. Tinta, *Cook & Gilbert* 211. Pucará, *Weberbauer* 415 in part. Cani, *Macbride* 3401. San Antonio, *Lechler* 1813b (Kew Herb.). Carumas, *Weberbauer* 7295.

BOLIVIA: Sorata, *Mandon* 1281, 1283. La Paz, *Buchtien* 160, 865; *Holway* in 1920. Talca Chugiaguilla, *Bang* 806. Capai, *Bang* 773. Potosí, *D'Orbigny* 201. Cuesta San Anaton, *Fiebrig* 3277. Totora, *Herzog* 2038, 2057. Cordillera San Bonito, *Herzog* 2226.

4. Muhlenbergia quitensis (H. B. K.) Hitchc. Contr. U. S. Nat. Herb. 17: 292. 1913.

Calamagrostis quitensis H. B. K. Nov. Gen. & Sp. 1: 133. 1816.[22]

Muhlenbergia calamagrostidea Kunth, Rév. Gram. 1: 63. 1829.

A rather delicate annual, with narrow but rather loose panicles; glumes 2 mm. long.

Cliffs and walls, Mexico, whence originally described, to Bolivia.

BOLIVIA: Without locality, *Bang* 487.

5. Muhlenbergia tenuissima (Presl) Kunth, Rév. Gram. 1: Suppl. XVI. 1830.

Podosaemum tenuissimum Presl, Rel. Haenk. 1: 230. 1830.

A delicate annual similar to *M. ciliata*, with narrow loose panicle, the branches spreading, few-flowered. Glumes more distinctly awned than in the Mexican plants.

Cliffs and walls, Mexico to Brazil and Bolivia. Originally described from Panama.

PERU: Between Tarma and La Merced, *Hitchcock* 22154.

BOLIVIA: La Florida, *Hitchcock* 22622. Yungas, *Rusby* 16; *Bang* 680.

6. Muhlenbergia microsperma (DC.) Kunth, Rév. Gram. 1: 64. 1829.

Trichochloa microsperma DC. Cat. Hort. Monsp. 151. 1813.

Podosaemum debile H. B. K. Nov. Gen. & Sp. 1: 128. 1816. (Ecuador.)

Trichochloa debilis Roem. & Schult. Syst. Veg. 2: 385. 1817.

Muhlenbergia debilis Kunth, Rév. Gram. 1: 63. 1829.

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[22] This species was described from Mexico. The specific name seems to have been given inadvertently. Kunth changed the name to *M. calamagrostidea*.

A freely branching, weedy, spreading annual, with numerous panicles, the lemmas with a delicate awn 1 to 1.5 mm. long.

Cliffs and walls, Mexico, whence originally described, to Peru.

ECUADOR: Huigra, *Hitchcock* 20399; Rose 22550, 24018. Tumbaco, *Sodiro* in 1892; *Mille* 246. Quito, *Jameson* 248 (Kew Herb.).

PERU: Obrajillo, *Wilkes Expl. Exped.* Matucana, *Macbride & Featherstone* 392. Huánuco, *Macbride* 3217, 3514.

7. Muhlenbergia ligularis (Hack.) Hitchc.

Sporobolus ligularis Hack. Oesterr. Bot. Zeitschr. **52**: 57. 1902.

A loosely tufted, mostly decumbent-spreading perennial, with flat blades mostly 1 to 2 cm. long and small panicles of spikelets about 2 mm. long. Resembles *M. fastigiata*, but the culms less tufted and lacking the strong creeping rootstocks, the blades flat instead of involute.

Open ground Ecuador to Bolivia. Originally described from Ecuador. (*Sodiro*, without definite locality.)

ECUADOR: Pifo, *Sodiro* in 1899; *Mille* 243. Quito, *Karsten*.

PERU: Hacienda Atocsaico, *Stordy* 27 (Kew Herb.).

BOLIVIA: Sorata, *Mandon* 1286. La Paz, *Rusby* 51; *Bang* 109; *Asplund* 6498, 6510; *Hitchcock* 22586. Pongo, *Hitchcock* 22763. Cochabamba, *Hitchcock* 22818. Rinconada, *Hitchcock* 22596.

8. Muhlenbergia fastigiata (Presl) Henr. Med. Rijks Herb. Leiden **40**: 59. 1921.

Sporobolus fastigiatus Presl, Rel. Haenk. **1**: 241. 1830.

A low tufted perennial, with numerous wiry creeping rootstocks, decumbent culms mostly not over 10 cm. tall, numerous distichous involute falcate blades mostly less than 1 cm. long, and small narrow few-flowered panicles of dark-colored spikelets about 2 mm. long.

Open ground, Peru, whence originally described, to Argentina. (*Haenke.*)

PERU: Between Santa Rosa and Araranca, *Cook & Gilbert* 168. Oroya, *Hitchcock* 22135. Chuquibambilla, *Hitchcock* 22448.

BOLIVIA: Pasña, *Buchtien* 1207. Puna Patanca, southern Bolivia, *Fiebrig* 2633.

9. Muhlenbergia flexuosa Hitchc., sp. nov.

Perennial; culms erect or decumbent, loosely cespitose, slender, wiry, glabrous, about 30 cm. tall; ligule truncate, less than 0.5 mm. long, lacerate; blades flat, scattered along the lower part of the stem, scabrous, acuminate, 2 to 3 cm. long, 1 to 2 mm. wide; panicles narrow, rather dense, almost spikelike, 4 to 7 cm. long; glumes unequal, narrow, acuminate, awn-tipped, scabrous on the keel, 1-nerved, pale, the first 3 mm. long, the second 4 mm. long; lemma 3-nerved, about 3.5 mm. long, narrow, villous about the base and for one-third the distance above, awned, the awn slender, flexuous, about 2 cm. long; palea as long as the lemma, acuminate.

Type in herbarium of the Field Museum, no. 534,937, collected at summit of rocky crest, Huacachi Estación near Muña, Peru, altitude 2,000 meters, May 20 to June 1, 1923, by J. Francis Macbride (no. 3874).

The only other specimen seen is from Río Huallaga Canyon below Río Santo Domingo, Peru, altitude 1,200 meters, *Macbride* 4205.

The short flat blades, spikelike panicles, and slender flexuous awns are sufficient to characterize the species. It is allied to *M. flaviseta* Scribn. and *M. scabra* S. Wats., both of Mexico.

10. Muhlenbergia angustata (Presl) Kunth, Rév. Gram. **1**: Suppl. XVI. 1830.

Crypsis stricta H. B. K. Nov. Gen. & Sp. **1**: 140. 1816. Not *Muhlenbergia stricta* Kunth, 1830, nor *Epicampes stricta* Presl, 1830.

Podosaemum angustatum Presl, Rel. Haenk. 1: 229. 1830.
Epicampes kunthiana Griseb. Abh. Ges. Wiss. Göttingen 19: 256. 1874.
Epicampes coerulea Griseb. Abh. Ges. Wiss. Göttingen 19: 256. 1874.
Muhlenbergia coerulea Mez, Repert. Nov. Sp. Fedde 17: 213. 1921.

A densely cespitose erect perennial 40 to 80 cm. tall, with firm folded scabrous blades, drooping forward with a strong circular bend at base, the firm ligule commonly 5 to 10 mm. long, and dense, tawny or lead-colored, spikelike panicles 10 to 15 cm. long; glumes 6 to 7 mm. long, narrow, acuminate or awn-pointed, scaberulous; lemma about as long as glumes, scaberulous, acuminate, or bearing a slender straight awn as much as 6 mm. long.

Rocky slopes and grassy plains, Colombia to Argentina. Originally described from Peru. (*Haenke.*)

ECUADOR: Paramos of Mount Igualata, *Mille* 267. Mount Pichincha, *Jameson* in 1864. Mount Chimborazo, *Mille* in 1920. Quito, *Holway* 952. Between Loja and San Lucas, *Hitchcock* 21461.

PERU: Yanahuanca, *Macbride & Featherstone* 1204. Oroya, *Hitchcock* 22182. Mito, *Macbride & Featherstone* 1721, 1929. Goyllarisquisca, *Hitchcock* 22308.

BOLIVIA: Sorata, *Mandon* 1279. Calderillo, *Fiebrig* 3173.

11. Muhlenbergia holwayorum Hitchc., sp. nov.

Perennial, cespitose, erect; culms glabrous, 40 to 60 cm. tall; sheaths glabrous; ligule firm, 3 to 5 mm. long; blades scabrous, flat, becoming involute or those of the innovations closely involute, those of the culm 1 to 3 mm. wide, 10 to 20 cm. long, tapering into a fine point; panicle narrow, tawny or lead-colored, 15 to 20 cm. long, the branches appressed and overlapping, the lower as much as 5 cm. long, these and the main axis scabrous, the pedicels slender, the lateral 1 to 2 mm. long, appressed; glumes nearly equal in length, about 1.5 mm. long, acute, the second broader; lemma narrow, 3 to 4 mm. long, firm, prominently 3-nerved, the callus with a few very short hairs, the apex very minutely toothed, the awn straight, mostly 3 to 4 mm. long; palea as long as the lemma.

Type in the U. S. National Herbarium, no. 1,108,445, collected at Sorata, Bolivia, April 16, 1920, by E. W. D. and Mary M. Holway (no. 530).

Besides the type there are two other specimens in the U. S. National Herbarium, collected by Dr. H. H. Rusby, at Sorata, altitude 3,000 meters, nos. 201 and 206.

This species is closely allied to *M. acuminata* Vasey of Mexico (based on *Wright* 1993 from New Mexico), which may be the same as *M. dubia* Fourn. of Mexico (Chinantla, *Liebmann* 688), though the latter is awnless. *M. holwayorum* differs in the shorter glumes and longer awns. The blades are flat, becoming involute, rather lax, while in *M. acuminata* they are stiffly involute.

12. Muhlenbergia rigida (H. B. K.) Kunth, Rév. Gram. 1: 63. 1829.
Podosaemum rigidum H. B. K. Nov. Gen. & Sp. 1: 129. 1816.
Podosaemum elegans H. B. K. Nov. Gen. & Sp. 1: 130. 1816. (Near Mount Chimborazo.)
Trichochloa elegans Roem. & Schult. Syst. Veg. 2: 387. 1817.

An erect cespitose perennial 40 to 80 cm. tall, with firm involute blades and narrow, dark purple panicles 15 to 20 cm. long, the capillary branches ascending or appressed; glumes 1.5 to 2 mm. long; lemma 5 mm. long; awn 1 to 1.5 cm. long.

Rocky or grassy slopes, Mexico, whence originally described, to Argentina.

ECUADOR: Near Mount Chimborazo, *Bonpland.*

PERU: Tarma, *Hitchcock* 22165. Matucana, *Macbride & Featherstone* 358. Viso, *Macbride & Featherstone* 765. Ollantaytambo, *Cook & Gilbert* 514. Mito, *Macbride* 3320.

BOLIVIA: Sorata, *Holway* 514; *Mandon* 1280. La Paz, *Buchtien* 819. Cochabamba, *Hitchcock* 22862.

52. TRINIOCHLOA Hitchc.

Spikelets 1-flowered; glumes membranaceous, thin, papery; lemma narrow, rounded on the back, firmer than the glumes, awned, the awn dorsal, geniculate.

1. **Triniochloa stipoides** (H. B. K.) Hitchc. Contr. U. S. Nat. Herb. 17: 303. 1913.

Podosaemum stipoides H. B. K. Nov. Gen. & Sp. 1: 131. 1816.

Trichochloa stipoides Roem. & Schult. Syst. Veg. 2: 288. 1817.

A loosely cespitose perennial, with glabrous, somewhat angled culms 50 to 100 cm. tall, sulcate scaberulous sheaths, and open panicles 10 to 20 cm. long, the branches verticillate, distant, ascending or spreading, few-flowered; lemmas terete, slender, about 1 cm. long, the glumes one-third as long; awn about 1 cm. long, attached below the 2-toothed apex.

Grassy paramos and bushy slopes, Mexico to Bolivia. Originally described from Chillo, Ecuador. (*Bonpland.*)

ECUADOR: Quito, *Harteman* 40; *Mille* 245; *Sodiro* in 1898. Between Malchinguí and Pomasqui, *Hitchcock* 20886. Huigra, *Hitchcock* 20627. Between Oña and San Lucas, *Hitchcock* 21632. Between Loja and San Lucas, *Hitchcock* 21444.

PERU: Mito, *Macbride & Featherstone* 1696; *Macbride* 3350.

BOLIVIA: San Felipe, *Hitchcock* 22602. Unduavi, *Buchtien* 4172.

53. ACIACHNE Benth. MOSSGRASS.

Spikelets 1-flowered, perfect, solitary on short peduncles among the leaves; glumes obtuse, shorter than the fruit; lemma indurate, fusiform, extending into a sharp firm point.

1. **Aciachne pulvinata** Benth. Hook. Icon. Pl. 4: 44. *pl. 1362*. 1881.[24]

Agrostis delicatula Steud.; Lechl. Berb. Amer. Austr. 56. 1857, name only. (*Lechler* 1813.)

A densely tufted, tussock-forming perennial, with numerous firm falcate involute blades mostly about 1 cm. long, and solitary spikelets scarcely raised above the general contour of the tussock.

Hills at high elevations (3,500 to 4,500 meters), Venezuela to Bolivia. Originally described from the "Andes," specimens being cited from Peru and Bolivia.

PERU: Cerro de Pasco, *Hitchcock* 22249, 22256. Hacienda Atocsaico, *Hitchcock* 22218. Huarón, *Macbride & Featherstone* 1157. Panticalla Pass, *Cook & Gilbert* 1828. Araranca, *Cook & Gilbert* 173. San Antonio, *Lechler* 1813. Ayapata, *Lechler* 3234 (Kew Herb.). Without locality, *Wilkes Expl. Exped.*

BOLIVIA: Mount Illimani, *Hitchcock* 22592. Chacaltaya, *Buchtien* 1206. Sorata, *Mandon* 1287. La Cumbre, *Asplund* 6494. Pongo, *Hitchcock* 22783. Southern Bolivia, *Fiebrig* 3571 (Kew Herb.). Without locality, *Bang* 1843.

In the Kew Herbarium there are two specimens of *Aciachne* that appear to represent species different from *A. pulvinata*, but the material is too fragmentary for satisfactory study. One, collected by Jameson (no. 157) at Salinas, Ecuador, is said to be abundant on marshy ground, forming a dense mat. Salinas is on the coast, while *Aciachne pulvinata* is an alpine plant.

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[24] See also Chase, *Aciachne*, a cleistogamous grass of the high Andes: Journ. Washington Acad. Sci. 14: 364. 1924.

In the Salinas specimen the glumes are 3 mm. long and the subulate-pointed lemma is 6.5 mm. long (larger than in *A. pulvinata*). The blades are similar to those of *A. pulvinata* but are somewhat thicker and the plant is more loosely cespitose.

The other specimen was collected by Lechler (no. 2599) at Sachapata, Peru. The blades are firm and closely involute but are erect and nearly straight, not falcate as in *A. pulvinata*. The inflorescence is a panicle 3 to 4 cm. long. Nearly all the fruits have fallen away, but the one or two remaining are similar to those of *A. pulvinata*. In *A. pulvinata* the spikelets are solitary and scarcely raised above the leaves.

The Lechler specimen cited above is probably the one referred to by Bentham as being possibly the staminate form of *Aciachne pulvinata*, though he gives the number as 599 instead of 2599.

54. SPOROBOLUS R. Br.

Spikelets in open or spikelike panicles, awnless; glumes shorter than the floret; palea readily splitting; pericarp of the caryopsis loose, the seed readily falling therefrom.

Plants annual. Panicles delicate, loosely flowered, the spikelets scarcely 1 mm. long ..... 1. S. tenuissimus.
Plants perennial.
  Creeping scaly rootstocks present.
    Culms decumbent; panicle diffuse ..... 2. S. asperifolius.
    Culms erect; panicles condensed or spikelike ..... 3. S. virginicus.
  Creeping rootstocks wanting.
    Panicle branches in distinct whorls; panicles often more or less pyramidal.
      Spikelets about 1.5 mm. long; foliage relatively soft ..... 4. S. argutus.
      Spikelets more than 3 mm. long; wiry bunch grasses. Glumes shining.
        Panicles narrow, oblong or slightly pyramidal; branches spikelet-bearing nearly to the base.
          Spikelets copper-colored; lower sheaths felty; blades folded or involute ..... 6. S. aeneus.
          Spikelets greenish brown; lower sheaths not felty; blades flat. ..... 7. S. purpurascens.
        Panicles open, pyramidal; branches naked at base.
          Foliage not crowded at base, the sheaths not felty ..... 5. S. eximius.
          Foliage crowded at base, the short basal sheaths felty. ..... 8. S. lasiophyllus.
    Panicle branches not in whorls; panicles narrow or spikelike, as much as 30 cm. long.
      Glumes acute, more than half the length of the spikelet ..... 9. S. mirabilis.
      Glumes obtuse, less than half the length of the spikelet.
        Panicle branches slender, rather loosely arranged; blades slender and lax; glumes about 0.3 mm. long ..... 10. S. indicus.
        Panicle branches short, contiguous, forming a narrow rather compact spike; blades firm, as much as 5 mm. wide; glumes 0.5 to 1 mm. long ..... 11. S. berteroanus.

1. Sporobolus tenuissimus (Mart.) Hack. Bull. Herb. Boiss. II. 4[3]: 278. 1904.
Panicum tenuissimum Mart.; Schrank, Denkschr. Bot. Ges. Regensb. 2: 26. 1822.[35]
Agrosticula muralis Raddi, Agrost. Bras. 33. *pl 1. f. 2.* 1823.

[35] I have not seen this work. The reference is given on the authority of Hackel.

Sporobolus minutiflorus Link, Hort. Berol. 1: 88. 1827.

Sporobolus muralis Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 368. 1917.

A slender pale glabrous ascending annual 30 to 70 cm. tall, with compressed culms, flat blades 2 to 3 mm. wide, and narrow, loosely flowered panicles about half the entire length of the plant, the delicate branches ascending, the minute spikelets long-pediceled.

Open ground, Lesser Antilles to Brazil, Bolivia, and Paraguay.

BOLIVIA: Between Río Piray and Río Cuchi, *Herzog* 1446.

2. Sporobolus asperifolius Nees & Mey. Nov. Act. Acad. Caes. Leop. Carol. **19:** Suppl. **1: 9. 1841; 141. 1843.**

A decumbent perennial 20 to 40 cm. tall, with numerous creeping rhizomes, short flat blades, and diffuse panicles 10 to 15 cm. long, the branches and long pedicels capillary; spikelets about 2 mm. long.

Moist places, southwestern United States and northern Mexico; southern Bolivia southward. Originally described from Chile.

BOLIVIA: Oploca, *Hitchcock* 22891.

In this specimen some of the spikelets are 2-flowered or even 3-flowered. Such spikelets are not infrequent in this species.

3. Sporobolus virginicus (L.) Kunth, Rév. Gram. 1: 67. 1829.

Agrostis virginica L. Sp. Pl. 63. 1753.

Vilfa luxurians Steud.; Lechl. Berb. Amer. Austr. 56. 1857, name only. (Arica, *Lechler* 1544.)

Culms 15 to 40 cm. tall, erect from extensively creeping, hard, scaly rhizomes, the numerous leaves conspicuously distichous, the sheaths overlapping, the blades firm, involute-pointed; panicles spikelike, commonly not over 5 cm. long.

Sandy or saline soil, Virginia, whence originally described, to Brazil and Chile. Extensive colonies of sterile plants often found along sandy beaches.

ECUADOR; Puerto Bolívar, *Hitchcock* 21101. Chanduy, *Spruce* 6449 (Kew Herb.).

PERU: Salaverry, *Macbride & Featherstone* 47a. Callao, *Didrichsen* 4383; *Wilkes Expl. Exped.* Mollendo, *Hitchcock* 22353.

4. Sporobolus argutus (Nees) Kunth, Enum. Pl. 1: 215. 1833.

Vilfa arguta Nees, Agrost. Bras. 395. 1829.

Vilfa ambigua Steud. Syn. Pl. Glum. 1: 153. 1854. (*Jameson* 578.)

A low tufted glabrous perennial with spreading culms, rather thick subinvolute short blades, and pale many-flowered panicles, at first contracted, at maturity narrowly pyramidal.

Open sandy or alkaline soil, southwestern United States to Argentina. Originally described from Brazil.

ECUADOR: El Recreo, *Eggers* 15701. Chanduy, *Spruce* 6450. Between Otavalo and Malchinguí, *Hitchcock* 20834. Guayaquil, *Hitchcock* 19977; *Jameson* 578 (Kew Herb.). Between Guayaquil and Salinas, *Hitchcock* 20000. Machala, *Hitchcock* 21103.

BOLIVIA: La Paz, *Hitchcock* 22594; *Bang* 79. Cotaña, *Buchtien* 3124. Reyes, *White* 1545. Cochabamba, *Hitchcock* 22787, 22834. Tarija, *Fries* 1093.

5. Sporobolus eximius (Nees) Ekman, Ark. för Bot. **13:** 41. 1913.

Vilfa eximia Nees; Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 4^1: 77. 1840.

An erect perennial 30 to 50 cm. tall, with firm flat blades 3 to 4 mm. wide, and pyramidal open panicles 10 to 15 cm. long, the branches in whorls, naked below, the dark spikelets 5 to 6 mm. long.

Grassland, Brazil, whence originally described, to Bolivia.

BOLIVIA: Toldos, near Bermejo, *Fiebrig* 2384 (Kew Herb.).

6. Sporobolus aeneus (Trin.) Kunth. Rév. Gram. **1: Suppl. XVII.** 1830.

Vilfa aenea Trin. Gram. Icon. **1:** *pl. 23.* 1826.

Plants in dense bunches with numerous innovations; culms 30 to 60 cm. tall, the basal sheaths (especially of the innovations) woolly or villous; blades long and narrow, firm, folded; panicle narrow but open, the branches ascending, more or less whorled; spikelets 3 mm. long, the first glume about half as long.

Sandy barrens, Brazil, whence originally described, and Bolivia.

BOLIVIA: Hacienda Casana, *Buchtien* 7147.

7. Sporobolus purpurascens (Swartz) Hamilt. Prodr. Pl. Ind. Occ. 5. 1825.

Agrostis purpurascens Swartz, Prodr. Veg. Ind. Occ. 25. 1788.

Culms slender, erect, tufted, with numerous short leaves at base, naked above, the blades flat or, especially on the innovations, folded; panicle 10 to 15 cm. long, the short branches in usually rather distinct whorls, spikelet-bearing to the base.

Grassy slopes, southern United States to Brazil and Ecuador. Originally described from Jamaica.

ECUADOR: Between La Toma and Loja, *Hitchcock* 21418. Between Loja and San Lucas, *Hitchcock* 21463.

8. Sporobolus lasiophyllus Pilger, Bot. Jahrb. Engler **37: 504. 1906.**

A densely tufted perennial from a thick felty caudex with erect culms 20 to 40 cm. tall, loosely involute blades 1 to 5 cm. long, crowded at the base, felty around the sheaths, and long-exserted pyramidal panicles 2 to 5 cm. long; spikelets 3 to 4 mm. long.

Rocky slopes, Colombia to Peru. (Type, *Weberbauer* 2467.)

PERU: Prov. Tarma, *Weberbauer* 2381, 2467. Huacachi, *Macbride* 4073. Mito, *Macbride* 3315.

9. Sporobolus mirabilis Pilger, Bot. Jahrb. Engler **56: Beibl. 123:** 27. 1920.

A tall stout perennial, with flat blades as much as 60 cm. long and 1.5 cm. wide, the lower sheaths finally flat and spirally curled and weathering to strong fibers; panicle narrow, rather dense, 30 to 35 cm. long, the spikelets 2.5 mm. long.

Known only from the type collection.

PERU: Grassy plains among shrubs, Prov. Jaen, Dept. Cajamarca, alt. 700 to 800 meters, *Weberbauer* 6186.

10. Sporobolus indicus (L.) R. Br. Prodr. Fl. Nov. Holl. **1:** 170. 1810.

Agrostis indica L. Sp. Pl. 63. 1753.

Sporobolus jacquemontii Kunth, Rév. Gram. **2:** 427. *pl. 127.* 1831.

Resembling *S. berteroanus*, but the blades more slender, especially at base, and the branches of the panicle longer, more slender, and more or less spreading.

Grassy slopes and plains at low altitudes, Mexico to Brazil. Originally described from Jamaica.

BOLIVIA: Reyes, *White* 1536, 1658. Buena Vista, *Steinbach* 6701, 6843, 6844, 6852, 6854.

11. Sporobolus berteroanus (Trin.) Hitchc. & Chase, Contr. U. S. Nat. Herb. **18: 370. 1917.**

Vilfa berteroana Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 4^1: 100. 1840.

Vilfa familiaris Steud.; Lechl. Berb. Amer. Austr. 56. 1857, name only. (*Lechler* 1728.)

An erect tufted perennial as much as 1 meter tall, with flat blades becoming involute, especially at the slender point, and spikelike panicles mostly 10 to 25 cm. long, the branches 1 to 2 cm. long, appressed.

Open ground, southern United States to Argentina. Originally described from Santo Domingo. In South American floras this has been confused with *S. indicus*. It is probably the same as *S. elongatus* R. Br. of Australia.

ECUADOR: Quito, *Sodiro* 244. Ambato, *Hitchcock* 21741. Riobamba, *Holway* 862. Alausí, *Hitchcock* 20709. Huigra, *Hitchcock* 20382. Chambo River, *Spruce* 5933 (Kew Herb.).

PERU: Lamas, *Spruce* 4855 (Kew Herb.). Colonia Perené, *Hitchcock* 22108. Tarma, *Hitchcock* 22151; *Macbride & Featherstone* 1031. Mito, *Macbride & Featherstone* 1421. Callao, *Wilkes Expl. Exped.* Ollantaytambo, *Cook & Gilbert* 477, 516, 518; *Hitchcock* 22520. Cuzco, *Hitchcock* 22507. Arequipa, *Hitchcock* 22434. Azángaro, *Lechler* 1728 (Kew Herb.).

BOLIVIA: Sorata, *Rusby* 202; *Mandon* 1285. Coroico, *Buchtien* 3637. San Felipe, *Hitchcock* 22604. La Florida, *Hitchcock* 22628. La Paz, *Rusby* 55; *Cárdenas* (*Mulford Biol. Expl.*) 695; *Holway* 481; *Buchtien* 503, 2527. Cochabamba, *Holway* 351; *Hitchcock* 22801. Tarija, *Fries* 1105. "Bolivian Plateau," *Bang* 2591. Buena Vista, *Steinbach* 5148.

55. ORYZOPSIS Michx.

Differing from *Stipa* chiefly in the short broad fruit and the short deciduous awn; lemma usually pubescent, the callus short, blunt, oblique; awn short, straight or flexuous, sometimes geniculate and twisted, symmetrically attached.

1. Oryzopsis florulenta Pilger, Bot. Jahrb. Engler 27: 26. 1899.

A slender erect perennial 1 meter tall, with flat or loosely involute, erect blades and narrow loose panicles 20 cm. long, the slender branches naked below; glumes 4 to 5 mm. long; fruit about 3 mm. long, the awn about 1.5 cm. long.

Rocky slopes, Mexico to Bolivia. Originally described from Colombia.

BOLIVIA: Sorata, *Mandon* 1270 (in part).

56. NASSELLA Desv.

Similar to *Oryzopsis* but differing in the obliquely obovate fruit, gibbous at the summit, and the excentrically attached awn; palea short, membranaceous, without nerves or keels.

Fruit 2.5 mm. long, villous ..... 1. N. asplundii.
Fruit 1.5 to 2 mm. long, villous or glabrous ..... 2. N. pubiflora.

1. Nassella asplundii Hitchc., sp. nov.

Perennial, cespitose; culms erect, glabrous 2-noded, 30 to 60 cm. tall; leaves mostly in a stiff basal cluster, the sheaths glabrous, those of the innovations sparsely villous at the throat; ligule very short on the innovations, 1 to 2 mm. long on the culms; blades involute, mostly less than 5 cm. long, the uppermost on the culm often not over 1 cm. long; panicle open, oblong or pyramidal, 8 to 15 cm. long, the branches few-flowered, capillary, spreading, mostly in pairs, naked below, the lowermost as much as 5 cm. long, the main axis and the branches smooth, the pedicels somewhat hirsute-scabrous; spikelets few to several on the upper half of the branches, rather loosely arranged; glumes nearly equal, broadly lanceolate, acute, about 4 mm. long, 3-nerved, the first ciliate on the keel; lemma oblong, somewhat asymmetric, densely appressed-villous, 2.5 mm. long, including the acute callus, the apex somewhat oblique, slightly crowned or thickened just below the awn, with an apiculation on one side; awn deciduous, about 1.5 cm. long, weakly twice geniculate, villous on the lower part, scabrous above.

Type in the U. S. National Herbarium no. 1,099,355, collected at Uyuni, Bolivia, altitude 3,700 meters, March 25, 1921, by Dr. E. Asplund (no. 6548).

The only other specimen seen was collected by Dr. Asplund at Atocha, altitude 3,700 meters (no. 6549).

2. Nassella pubiflora (Trin. & Rupr.) Desv. in Gay, Fl. Chil. 6: 264. 1853.

Urachne pubiflora Trin. & Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. 5[1]: 21. 1842.

Urachne laevis Trin. & Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. 5[1]: 20. 1842. (Peru, *Meyen.*)

Urachne meyeniana Trin. & Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. 5[1]: 20. 1842.

Calamagrostis anomala Steud.; Lechl. Berb. Amer. Austr. 56. 1857, name only. (*Lechler* 1736.)

Oryzopsis caespitosa var. *peruviana* Ball, Journ. Linn. Soc. Bot. 22: 58. 1885. (Rimac Valley, *Ball* in 1882.)

Nassella flaccidula var. *humilior* Hack. Repert. Nov. Sp. Fedde 6: 155. 1908. (La Paz, *Buchtien* 157 in part).

Nassella corniculata Hack. Repert. Nov. Sp. Fedde 6: 155. 1908. (*Buchtien* 157 in part.)

Nassella deltoidea Hack. Repert. Nov. Sp. Fedde 11: 23. 1912. (*Buchtien* 2484.)

Piptochaetium laeve Pilger, Bot. Jahrb. Engler 56: Beibl. 123: 26. 1920.

Nassella trichophylla Henr. Med. Rijks Herb. Leiden 40: 57. 1921. (*Herzog* 3011.)

Stipa pflanzii Mez, Repert. Nov. Sp. Fedde 17: 206. 1921. (Palca, Bolivia, *Pflanz.*)

A densely cespitose, erect to spreading perennial 20 to 50 cm. tall, with flat or usually involute blades, and narrow (or sometimes open) panicles 5 to 15 cm. long, the branches mostly appressed, many-flowered, floriferous to base; fruit flattish, pubescent or glabrous, 1.5 to 2 mm. long.

Open ground and grassy hills, Ecuador to Chile. Originally described from Peru. (*Meyen.*)

Ecuador: Alausí, *Hitchcock* 20686. Pifo, *Sodiro.* Urbina, *Hitchcock* 22018.

Peru: Obrajillo, *Wilkes Expl. Exped.* Baños, *Wilkes Expl. Exped.* Matucana, *Macbride & Featherstone* 228. Río Blanco, *Macbride & Featherstone* 731. Oroya, *Macbride & Featherstone* 956; *Hitchcock* 22178. Tarma, *Macbride & Featherstone* 1065; *Hitchcock* 22164. Arequipa, *Hitchcock* 22438. Cuzco, *Hitchcock* 22481, 22503; *Holway* 744. Chuquibambilla, *Hitchcock* 22446. Ollantaytambo, *Hitchcock* 22523. Rimac Valley, *Ball* in 1882 (Kew Herb.). Azángaro, *Lechler* 1736 (Kew Herb.). Lake Titicaca, *Meyen* (Kew Herb.). Carumas, *Weberbauer* 7339.

Bolivia: La Paz, *Buchtien* 157 (in part), 2484, 2485, 2486, 2487, 2488; in 1913 (Kew Herb.); *Rusby* 226; *Holway* 418, 419, 430, 449, 464, 476, 479, 497; *Mandon* 1270 (in part). Palca, *Hitchcock* 22578, 22579, 22593, 22595; *Buchtien* 2522, 2533. Pasña, *Buchtien* 1190; *Asplund* 6543. Samaipata, *Herzog* 3011 (a fragment containing also a fruit of *Stipa obtusa*).

The fruit varies in size from 1.5 mm. to 2 mm. and from glabrous to pubescent. Several species have been differentiated on these variations, but the shape of the fruit, the glumes, panicles, and vegetative characters are so similar that it appears better to unite all under one species. Pilger[26] unites *Urachne pubiflora* and *U. laevis.*

[26] Bot. Jahrb. Engler 56: 26. 1920.

57. PIPTOCHAETIUM Presl

Differing from *Nassella* chiefly in the coriaceous palea, with 2 keels and a deep furrow between, the tip projecting beyond the lemma.

Fruit tuberculate----------1. P. tuberculatum.
Fruit smooth, minutely striate----------2. P. setifolium.

1. Piptochaetium tuberculatum Desv. in Gay, Fl. Chil. 6: 272. 1853.

A densely cespitose perennial 10 to 30 cm. tall, with slender erect culms, fine, involute, mostly basal blades, and narrow few-flowered panicles 2 to 4 cm. long; fruit dark brown, papillate-roughened.

Grassy or rocky slopes, Bolivia to Uruguay and Chile, whence originally described.

BOLIVIA: Sorata, *Holway* 547; *Mandon* 1274. Unduavi, *Buchtien* 6431.

2. Piptochaetium setifolium Presl, Rel. Haenk. 1: 222. 1830.

Stipa setifolia Kunth, Enum. Pl. 1: 182. 1833.

Urachne simplex var. *peruviana* Trin. & Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat 5[1]: 23. 1842.

Differing from *P. tuberculatum* in the smooth, minutely striate fruit.

Colombia to Peru, whence originally described. (*Haenke.*)

PERU: Without locality, *Haenke*, a fragment in the U. S. National Herbarium, from the type at the German University, Prague.

58. STIPA L.

Spikelets narrow; floret shorter than the membranaceous glumes, articulate obliquely above them, leaving a sharp-pointed callus at the base of the fruit; lemma indurate, terete, convolute, terminating in a prominent twisted awn with a definite line of demarcation between the body of the lemma and the awn.

Awn strongly plumose.
First segment of awn plumose----------1. S. speciosa.
First segment of awn villous only; the terminal segment plumose.
2. S. plumosa.
Awn not strongly plumose, often pubescent or villous.
Fruiting lemma not more than 3 mm. long; panicle long, narrow, dense, silvery.
Summit of lemma slightly hispidulous but not bearing long hairs.
3. S. pampagrandensis.
Summit of lemma bearing a dense ring of ascending or spreading hairs, 3 to 4 mm. long.
Blades closely involute----------4. S. ichu.
Blades flat----------5. S. milleana.
Fruiting lemma more than 3 mm. long, or if not, the panicle not long and dense.
Upper part of lemma pilose with long hairs (longer than those of the body.
Terminal segment of awn 2 cm. long, flexuous----------6. S. capilliseta.
Terminal segment of awn 1 to 1.5 cm. long, straight.
Throat of sheath villous. Ligule short----------7. S. nardoides.
Throat of sheath glabrous.
Panicle 5 to 6 cm. long, dense and spikelike----------8. S. hans-meyeri.
Panicle 12 to 20 cm. long, narrow but not dense----------9. S. rosea.

Upper part of lemma not conspicuously pilose, or the hairs not longer than those of the body.
Summit of lemma smooth, cylindric, forming a crown, usually slightly larger than the neck, often whitish.
Fruit 5 to 8 mm. long.
Fruit pubescent, at least in lines, to the summit, 5 to 6 mm. long.
Awns 1.5 to 3 cm. long——10. S. mucronata.
Fruit pubescent only on lower part, about 8 mm. long.
11. S. neesiana.
Fruit less than 5 mm. long.
Fruit obovate, turgid, 2.5 to 3 mm. long——12. S. inconspicua.
Fruit fusiform.
Fruit nearly glabrous above, about 3.5 mm. long——13. S. mexicana.
Fruit pubescent with appressed white hairs.
Fruit 2.5 to 3 mm. long——14. S. depauperata.
Fruit 4 mm. long——15. S. brachyphylla.
Summit of lemma not crowned.
Plants annual. Awn with scattered long hairs on the first segment.
16. S. annua.
Plants perennial.
Blades involute-filiform, firm.
Lemma villous, the upper hairs 1 to 2 mm. long——17. S. dasycarpa.
Lemma smooth on upper part or pubescent only.
Body of lemma pubescent.
Awn villous below with appressed hairs——18. S. curviseta.
Awn not villous.
Fruit 3 mm. long——19. S. featherstonei.
Fruit 5 mm. long——20. S. macbridei.
Body of lemma glabrous.
Fruit 4 mm. long; awn 2 cm. long——21. S. peruviana.
Fruit 3 mm. long; awn 1 cm. long.
Glumes obtuse, 3 mm. long——22. S. obtusa.
Glumes acute, 5 mm. long——23. S. rigidiseta.
Blades flat or loosely involute.
Culms much branched——24. S. polyclada.
Culms simple.
Awn pilose below——25. S. ibarrensis.
Awn not pilose.
Lemma 3.5 mm. long, 0.5 mm. wide; awn 3 cm. long.
26. S. illimanica.
Lemma 5 mm. long, narrow; awn 4 to 5 cm. long.
27. S. holwayi.

1. **Stipa speciosa** Trin. & Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. 5[1]: 45. 1842.

An erect rigid bunch grass 30 to 50 cm. tall, with brown, sometimes pubescent base, firm involute sharp-pointed blades, and narrow, rather dense panicles 5 to 10 cm. long; awn with a single bend, long-plumose on the first section nearly to the bend.

Rocky slopes and desert plains, southwestern United States; southern Bolivia to Argentina and Chile, whence originally described.

BOLIVIA: Pasña, *Buchtien* 1184. Uyuni, *Asplund* 6552.

2. Stipa plumosa Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. **2**[1]: 37. 1836.

A woody, erect or straggling perennial 1 to 2 meters long, with loose, wiry, knotty, mostly leafless base, loosely involute blades, and narrow loose feathery panicles 10 to 20 cm. long; awn carved or flexuous, 2 to 4 cm. long, plumose.

Rocky slopes, Peru to Argentina and Chile, whence originally described.

PERU: Obrajillo, *Wilkes Expl. Exped.* Matucana, *Macbride & Featherstone* 137. Ollantaytambo, *Cook & Gilbert* 684; *Hitchcock* 22557.

BOLIVIA: Comarapa, *Herzog* 1855. Pass between Oruro and Cochabamba, *Hitchcock* 22870.

3. Stipa pampagrandensis Speg. Anal. Mus. Nac. Montevideo **4**: 158. *f. 48.* 1901.

A slender, erect bunch grass 50 to 100 cm. tall, with slender involute blades and narrow loose panicles 10 to 20 cm. long, not much exceeding the blades; awn about 5 cm. long, with one bend, the terminal segment very slender and flexuous.

Grassy plains, southern Bolivia and northern Argentina, whence originally described.

BOLIVIA: Junaca, near Tarija, *Fries* 1308.

4. Stipa ichu (Ruiz & Pav.) Kunth, Rév. Gram. **1**: 60. 1829. ICHU GRASS.

Jarava ichu Ruiz & Pav. Fl. Peruv. Chil. **1**: 5. *pl. 6. f. b.* 1798.

Stipa eriostachya H. B. K. Nov. Gen. & Sp. **1**: 127. 1816. (Ecuador.)

Stipa pungens Nees & Mey. Nov. Act. Acad. Caes. Leop. Carol. **19**: Suppl. **1**: 19. 1841; 151. 1843. (Peru.)

An erect bunch grass as much as 1.5 meters tall, with slender firm involute blades and narrow, silky, white, tawny, or purplish panicles as much as 40 cm. long.

Dry hills and plains, Mexico to Argentina; common in the Andes at upper altitudes; called ichu grass; used for thatching. Originally described from Peru.

ECUADOR: Quito, *Mille* 255; *Spruce* 5923. Ambato, *Pachano* 93. Punín, *Anthony & Tate* 442. Alausí, *Hitchcock* 20701. Baños, *Lehmann* 5392 (Kew Herb.). Azogues, *Rose* 22799. Riobamba, *Rose* 23575.

PERU: Oroya, *Hitchcock* 22174; *Macbride & Featherstone* 952; *Rose* 18694. Goyllarisquisca, *Hitchcock* 22293. Matucana, *Macbride & Featherstone* 254, 335. Río Blanco, *Macbride & Featherstone* 644, 645. Cuzco, *Hitchcock* 22460. Ollantaytambo, *Hitchcock* 22527; *Cook & Gilbert* 676. Chuquibambilla, *Hitchcock* 22447. Occa Pampa, *Shepard* 63. Chivay, *Weberbauer* 6893 (Field Mus.).

BOLIVIA: Sorata, *Holway* 529; *Mandon* 1273. La Paz, *Holway*, 451, 597; *Buchtien* 2492. Palca, *Hitchcock* 22558, 22581; *Buchtien* 2544, 2545. Pasña, *Buchtien* 1185. Cochabamba, *Holway* 330, 342, 345, 362, 387, 389, 399; *Hitchcock* 22785, 22812. Atocha, *Hitchcock* 22872.

5. Stipa milleana Hitchc. Contr. U. S. Nat. Herb. **24**: 269. 1925.

A slender decumbent perennial as much as 1.5 meters tall, with flat blades as much as 1 cm. wide, and tawny or green, narrow or spikelike, more or less interrupted panicles as much as 30 cm. long.

Open grassland and among shrubs, Ecuador. (Type, *Mille* 256.)

ECUADOR: Quito, *Mille* 256, 259, 392; *Jameson* 251 (Kew Herb.); *Sodiro* in 1893. Alausí, *Hitchcock* 20698, 20727. Without locality, *Spruce* 5958 (Kew Herb.).

6. Stipa capilliseta Hitchc. Contr. U. S. Nat. Herb. **24**: 271. 1925.

An erect, densely cespitose, pale, slender perennial 50 cm. tall, with long slender involute blades, and narrow dense panicles 10 to 15 cm. long.

Known only from the type collection.

BOLIVIA: Chiguana, *Asplund* 6566.

7. **Stipa nardoides** (R. A. Phil.) Hack.; Hitchc. Contr. U. S. Nat. Herb. **24**: 271. 1925.

Danthonia nardoides R. A. Phil. Anal. Mus. Nac. Chile Bot. **8**: 84. 1891.

Stipa pachypus Pilger, Bot. Jahrb. Engler **56**: Beibl. **123**: 25. 1920. (*Weberbauer* 1487.)

A densely cespitose perennial 20 to 40 cm. tall, with short involute blades, closely aggregate, forming a basal tuft or cushion, and narrow, pale or purple panicles 5 to 10 cm. long.

Rocky slopes, Peru to Bolivia and northern Chile. Originally described from Tarapacá, Chile.

PERU: Mollendo, *Hitchcock* 22350; *Rose* 19535; *Weberbauer* 1487.

BOLIVIA: Uyuni, *Asplund* 6539.

8. **Stipa hans-meyeri** Pilger, Bot. Jahrb. Engler **56**: Beibl. **123**: 24. 1920.

Stipa nivalis Steud.; Lechl. Berb. Amer. Austr. 56. 1857, name only. (*Lechler* 1978.)

Similar to *S. nardoides*, the blades longer, the panicles purple.

Dry slopes, Ecuador to Bolivia. (Type, *Hans Meyer* 139.)

ECUADOR: Mount Chimborazo, alt., 4,500 meters, *Hans Meyer* 139.

PERU: Cerro de Pasco, *Hitchcock* 22241. Río Blanco, *Macbride & Featherstone* 803. Sandía, *Weberbauer* 1025. Between Cuyo-cuyo and Poto, *Weberbauer* 940. Ayapata, *Lechler* 1978 (Kew Herb.). Paucartambo, *Weberbauer* 6966 (Field Mus.).

BOLIVIA: Pongo, *Hitchcock* 22777. Sorata, *Mandon* 1272. La Cumbre, *Asplund* 6513, 6515. Comanche, *Asplund* 6564.

9. **Stipa rosea** Hitchc. Contr. U. S. Nat. Herb. **24**: 272. 1925.

An erect, densely cespitose perennial, 50 to 60 cm. tall, with slender stiff involute blades and narrow, rose-tinted, rather loose panicles 12 to 20 cm. long.

Open ground. Known only from the type collection.

ECUADOR: Between San Lucas and Oña, *Hitchcock* 21523.

10. **Stipa mucronata** H. B. K. Nov. Gen. & Sp. **1**: 225. 1816.

Stipa setigera Presl, Rel. Haenk. **1**: 226. 1830.

Stipa trochlearis Nees & Mey. Nov. Act. Acad. Caes. Leop. Carol. **19**: Suppl. **1**: 19. 1841; 151. 1843.

An erect or geniculate, tufted perennial 60 to 100 cm. tall, with flat or loosely involute blades (those of the innovations involute), and narrow, rather loose, mostly purplish panicles 10 to 30 cm. long.

Dry hills and plains, Mexico, whence originally described, to Argentina and Chile. Common in the Andes in fields, open ground, and along irrigating ditches.

ECUADOR: Tulcán, *Hitchcock* 20975, 20994, 21037, 21092. Between Malchinguí and Pomasqui, *Hitchcock* 20901. Quito, *Rose* 24029; *Harteman* 22, 58; *Spruce* 5406; *Mille* 257. Riobamba, *Mille* 57. Huigra, *Hitchcock* 20610, 20743, 20757, 20771. Alausí, *Hitchcock* 20721. Baños, *Hitchcock* 21900, 21920.

PERU: Goyllarisquisca, *Hitchcock* 22299, 22307. Hacienda Chinche, *Macbride & Featherstone* 1283. Baños, *Wilkes Expl. Exped.* Hacienda Atocsaico, *Hitchcock* 22211. Oroya, *Hitchcock* 22181. Matucana, *Macbride & Featherstone* 378. Cuzco, *Holway* 763 (foliage pubescent); *Hitchcock* 22483, 22505. Ollantaytambo, *Hitchcock* 22556.

BOLIVIA: Sorata, *Holway* 511; *Mandon* 1276 (Kew Herb.). La Paz, *Holway* 423; *Buchtien* 430 (Kew Herb.), 856, 3962; *Cárdenas* (*Mulford Biol. Expl.*) 70 S; *Aspluna* 6560. Palca. *Hitchcock* 22577, 22580. Cochabamba, *Hitchcock* 22799.

11. Stipa neesiana Trin. & Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. **5**: 27. 1842.

Stipa manicata Desv. in Gay, Fl. Chil. **6**: 288. 1853.

Resembling *S. mucronata*, but with longer awns and longer lemmas, pubescent only on the lower part.

Open ground, grassy places, and fields, Ecuador to Argentina and Chile. Originally described from Uruguay.

ECUADOR: La Rinconada Ranch, *Hitchcock* 20809. Quito, *Holmgren* 527.

PERU: Cuzco, *Hitchcock* 22502, 22510.

BOLIVIA: Sorata, *Rusby* 237; *Mandon* 1276 (N. Y. Bot. Gard.). Cochabamba, *Holway* 328; *Hitchcock* 22850.

12. Stipa inconspicua Presl, Rel. Haenk. **1**: 227. 1830.

Urachne haenkeana Trin. & Rupr. Mém. Acad. St. Pétersb. VI Sci. Nat. **5**: 20. 1842.

Nassella caespitosa Griseb. Abh. Ges. Wiss. Göttingen **19**: 258. 1874.

Stipa caespitosa Speg. Anal. Mus. Nac. Montevideo **4**: 117. *f. 31.* 1901.

Stipa sodiroana Hack. Oesterr. Bot. Zeitschr. **52**: 10. 1902. (Quito, *Sodiro.*)

Nassella flaccidula Hack. Repert. Nov. Sp. Fedde **6**: 154. 1908. (*Buchtien* 157 in part.)

A low, densely cespitose perennial 10 to 20 cm. tall, with flat or involute blades and narrow panicles 5 to 10 cm. long.

Rocky plains and hills, Peru to Argentina. Original locality uncertain, but probably Peru.

ECUADOR: Riobamba, *Mille* 258. Between La Toma and Loja, *Hitchcock* 21381. Between Loja and San Lucas, *Hitchcock* 21455. Between Oña and Cuenca, *Hitchcock* 21605. Santa Rosa, *Rose* 23938.

PERU: Obrajillo, *Wilkes Expl. Exped.* Baños, *Wilkes Expl. Exped.* Río Blanco, *Macbride & Featherstone* 648. La Quinhua, *Hitchcock* 22258; *Macbride & Featherstone* 2033. Goyllarisquisca, *Hitchcock* 22292, 22295, 22311. Cuzco, *Hitchcock* 22452, 22514. Juliaca, *Harlan* in 1914.

BOLIVIA: Sorata, *Holway* 508. Lake Titicaca, *Buchtien* 2550; *Asplund* 6555, 6558. La Paz, *Buchtien* 157 in part; *Holway* 461, 600. Pongo, *Hitchcock* 22771. Unduavi, *Buchtien* 4257. Pasña, *Buchtien* 1188, 1189, Cochabamba, *Holway* 398; *Hitchcock* 22800, 22833, 22854. Atocha, *Hitchcock* 22880. Oro Ingenio, *Hitchcock* 22926. Ingenio del Oro, *Rusby* 247. Oruro, *Rose* 18925. Chiguana, *Asplund* 6553.

13. Stipa mexicana Hitchc. Contr. U. S. Nat. Herb. **24**: 247. 1925.

A tufted perennial, mostly 20 to 30 cm. tall, erect or sometimes spreading or prostrate, the culms as much as 60 cm. long, with narrow, flat or involute, mostly basal blades, and narrow, rather loose, mostly purple panicles 5 to 15 cm. long.

Grassy slopes, Mexico to Peru. Originally described from the State of Mexico.

PERU: Mito, *Macbride & Featherstone* 1876.

14. Stipa depauperata Pilger, Bot. Jahrb. Engler **56**: Beibl. **123**: 23. 1920.

Stipa leptothera var. *atroviolacea* Hack. Repert. Nov. Sp. Fedde **6**: 154. 1908. (*Buchtien* 855.)

Stipa depauperata var. *humilis* Pilger, Bot. Jahrb. Engler **56**: Beibl. **123**: 23. 1920. (*Weberbauer* 2615.)

Stipa depauperata var. *glabrata* Pilger, Bot. Jahrb. Engler **56**: Beibl. **123**: 23. 1920. (*Weberbauer* 3076.)

Stipa pumila Mez, Repert. Nov. Sp. Fedde **17**: 205. 1921. (Palea, *Pflanz.*)

A spreading cespitose perennial 20 to 50 cm. tall, with short, involute, mostly basal blades, and narrow, loose, brownish or purplish panicles 10 to 15 cm. long.

Grassy slopes, Ecuador to Bolivia. Originally described from Peru. (Type, *Weberbauer* 6903.)

ECUADOR: Alausí, *Hitchcock* 20708, 20712. Cotapaxi Station, *Hitchcock* 20774.

PERU: Sumbay, *Weberbauer* 6903, 6906 (Field Mus.). Caraz, *Weberbauer* 3076. Oroya, *Weberbauer* 2615.

BOLIVIA: La Paz, *Holway* 492. Calacoto, *Asplund* 6565. La Paz, *Buchtien* 855.

15. Stipa brachyphylla Hitchc. Contr. U. S. Nat. Herb. **24**: 275. 1925.

A cespitose, erect or spreading perennial 20 to 40 cm. tall, with short, involute, mostly basal blades, and narrow, rather few-flowered panicles 5 to 15 cm. long.

Dry plains and rocky slopes, Ecuador to Argentina. Originally described from Bolivia. (Type, *Buchtien* 858.)

ECUADOR: Between Oña and Cuenca, *Hitchcock* 21590.

PERU: Casa Cancha, *Wilkes Expl. Exped.* Río Blanco, *Macbride & Featherstone* 669. Tarma, *Hitchcock* 22161. Oroya, *Hitchcock* 22183. Cerro de Pasco, *Hitchcock* 22226, 22243. Between Juliaca and Cuzco, *Hitchcock* 22444.

BOLIVIA: Isla del Sol, *Asplund* 6557. La Paz, *Holway* 433; *Buchtien* 858.

16. Stipa annua Mez, Repert. Nov. Sp. Fedde **17**: 204. 1921.

A low spreading annual, 10 to 15 cm. tall.

Mountain slopes, Peru. (Type, *Weberbauer* 5353.)

PERU: Chosica, *Weberbauer* 5353. Moquegua, *Weberbauer* 7442. Mollendo, *Johnston* 3536.

17. Stipa dasycarpa Hitchc. Contr. U. S. Nat. Herb. **24**: 281. 1925.

An erect, closely cespitose perennial 30 to 40 cm. tall, with slender firm involute blades, and narrow, rather loose, few-flowered panicles 10 to 15 cm. long.

Known only from the type collection.

BOLIVIA: Chiguana, *Asplund* 6562.

18. Stipa curviseta Hitchc. Contr. U. S. Nat. Herb. **24**: 282. 1925.

A cespitose perennial 30 to 50 cm. tall, with involute blades and loose purple panicles 10 to 15 cm. long, the branches slender, spreading, the lower naked below, as much as 5 cm. long.

Dry hills, southern Bolivia. (Type, *Asplund* 6551.)

BOLIVIA: Atocha, *Asplund* 6547, 6550. Chiguana, *Asplund* 6554. Uyuni, *Asplund* 6551.

19. Stipa featherstonei Hitchc. Proc. Biol. Soc. Washington **36**: 196. 1923.

An erect cespitose perennial 20 to 40 cm. tall, with slender, involute, rather soft blades, and short dense purplish panicles 3 to 5 cm. long.

Mountain slopes, Peru. Known only from the type collection.

PERU: Río Blanco, *Macbride & Featherstone* 803a.

20. Stipa macbridei Hitchc. Proc. Biol. Soc. Washington **36**: 197. 1923.

A branched, straggling, rather woody perennial with short blades, flat below and capillary-involute above, and narrow loose panicles 15 to 20 cm. long.

Rocky slopes, Peru. (Type, *Macbride & Featherstone* 452.)

PERU: Matucana, *Macbride & Featherstone* 452. Ambo, *Macbride* 3176.

21. Stipa peruviana Hitchc. Contr. U. S. Nat. Herb. **24**: 285. 1925.

Stipa lechleriana Steud.; Lechl. Berb. Amer. Austr. 56. 1857, name only. (*Lechler* 1735.)

Allied to *S. obtusa* but with larger fruits and longer awns.

Known only from the type collection.

PERU: Azángaro, *Lechler* 1735.

22. Stipa obtusa (Nees & Mey.) Hitchc. Contr. U. S. Nat. Herb. **24**: 284. 1925.

Helopus obtusus Steud. Nom. Bot. ed. 2. **1**: 747. 1840, name only (with *Piptatherum obtusum* Nees & Meyen given as a synonym).

Piptatherum obtusum Nees & Mey. Nov. Act. Acad. Caes. Leop. Carol. **19**: Suppl. **1**: 18. 1841; 150. 1843.

Urachne obtusa Trin. & Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. **5**[1]: 22. 1842.

Stipa boliviensis Hack. Repert. Nov. Sp. Fedde **11**: 21. 1912. (*Buchtien* 2489.)

Oryzopsis neesii Pilger, Bot. Jahrb. Engler **56**: 26. 1920.

A densely cespitose, erect bunch grass 20 to 40 cm. tall, with numerous erect stiff slender involute blades, sometimes nearly as long as the culms, and narrow panicles 5 to 15 cm. long, the branches appressed; glumes obtuse, 3 mm. long.

Dry plains, Bolivia and Peru. Originally described from Arequipa. (*Meyen* in 1831.)

PERU: Arequipa, *Meyen* in 1831 (fragment).

BOLIVIA: La Paz, *Buchtien* 184 (N. Y. Bot. Gard.), 2489. Palca, *Buchtien* 2539.

Asplund's no. 6545, from Challapata, the inflorescence affected by fungus, may belong here.

23. Stipa rigidiseta (Pilger) Hitchc. Contr. U. S. Nat. Herb. **24**: 285. 1925.

Oryzopsis rigidiseta Pilger, Bot. Jahrb. Engler **56**: Beibl. **123**: 26. 1920.

Differing from *S. obtusa* in the acute glumes 5 mm. long, the shorter fruit (3 mm. instead of 3.5 mm.), and the scabrous instead of scabrous-pubescent awns.

Known only from the type collection.

PERU: Azángaro, *Weberbauer* 475.

24. Stipa polyclada Hack.; Stuck. Anal. Mus. Nac. Buenos Aires **21**: 80. 1911.

A branched, wiry, rather woody, straggling perennial with fascicled branches, short blades, and loose narrow panicles 5 to 10 cm. long.

Rocky slopes and canyons, southern Bolivia and northern Argentina, whence originally described.

BOLIVIA: Uyuni, *Asplund* 6563.

Asplund's no. 6556, Isla del Sol, the inflorescence affected by fungus, may belong here.

25. Stipa ibarrensis H. B. K. Nov. Gen. & Sp. **1**: 125. 1816.

Stipa patulifolia Pilger, Bot. Jahrb. Engler **27**: 26. 1899. (*Lehmann* 5286.)

A cespitose erect spreading perennial 30 to 60 cm. tall, with flat or involute blades and narrow pale panicles 10 to 20 cm. long.

Cliffs, walls, and grassy slopes, Ecuador, the type being from Ibarra. (*Bonpland.*)

ECUADOR: Between Malchinguí and Pomasqui, *Hitchcock* 20898. Quito, *Rose* 23536, 23574, 24066; *Holway* 907. Mount Cotopaxi, *Sodiro* in 1890. Ambato, *Hitchcock* 21709, 21716, 21719, 21745. Baños, *Hitchcock* 21913; *Lehmann* 5286 (Kew Herb.). Riobamba, *Mille* 254; *Spruce* 5817 (Kew Herb.).

26. Stipa illimanica Hack. Repert. Nov. Sp. Fedde **11**: 22. 1912.

A loosely cespitose, erect, or spreading perennial, with loosely involute blades and narrow pale panicles 10 cm. long.

Rocky slopes. Known only from the type collection.

BOLIVIA: Cotaña, *Buchtien* 3134.

27. Stipa holwayi Hitchc. Contr. U. S. Nat. Herb. **24**: 287. 1925.

An erect or somewhat geniculate perennial about 1 meter tall, with flat or involute blades and narrow loose panicles 15 to 25 cm. long.

Apparently confined to Bolivia. (Type, *Holway* 380.)

BOLIVIA: Cochabamba, *Holway* 380. Challapata, *Asplund* 6546.

STIPA TULCANENSIS Mez, Repert. Nov. Sp. Fedde **17**: 206. 1921. Described from Tulcán, Ecuador (*André*). This species has not been identified.

59. ARISTIDA L.

Spikelets in close or open panicles; glumes acuminate; lemma convolute, subindurate, with a pointed callus and bearing from the apex a usually trifid awn.

Plants annual.
- Fruit 2 to 3 mm. long; awns united into a column at base___1. A. capillacea.
- Fruit about 8 mm. long; awns not united into a column__2. A. adscensionis.

Plants perennial.
- Lateral awns obsolete_____3. A. schiedeana.
- Lateral awns present, usually as long as the central.
  - Column 1 to 3 cm. long, twisted.
    - Awns 3 to 5 cm. long; column 2 to 3 cm. long; base of callus entire. 4. A. implexa.
    - Awns about 2 cm. long; column about 1 cm. long; base of callus 2-toothed _____5. A. riparia.
  - Column short or none.
    - Glumes very unequal, the first about 9 mm. long, the second 2 to 3 mm. long_____6. A. mendocina.
    - Glumes equal or slightly unequal.
      - Panicle open, the distant spreading branches naked at base. 7. A. spadicea.
      - Panicle narrow, the branches ascending.
        - Awns contorted or loosely spiral at base.
          - Blades involute; plant 10 to 30 cm. tall_____8. A. setifolia.
          - Blades flat; plant 50 to 100 cm. tall_____9. A. marginalis.
        - Awns straight at base.
          - Blades involute; awns 1 to 1.5 cm. long_____10. A. enodis.
          - Blades flat; awns 1.5 to 3 cm. long.
            - Glumes about 7 mm. long_____11. A. circinalis.
            - Glumes about 10 mm. long_____12. A. complanata.

1. Aristida capillacea Lam. Tabl. Encycl. **1**: 156. 1791.

Aristida elegans Rudge, Pl. Guian. 22. *pl. 30*. 1805.

A delicate tufted annual 10 to 20 cm. tall; panicles narrow but somewhat open; fruit (excluding awns) 3 mm. long, the awns equal, about 5 mm. long.

Open ground, southern Mexico to Ecuador and Brazil. Originally described from tropical America.

ECUADOR: Between Portovelo and El Tambo, *Hitchcock* 21294.

BOLIVIA: Guanay, *Rusby* 208.

2. Aristida adscensionis L. Sp. Pl. 82. 1753.

Aristida humilis H. B. K. Nov. Gen. & Sp. **1**: 121. 1816.

Aristida bromoides H. B. K. Nov. Gen. & Sp. **1**: 122. 1816. (Ecuador.)

Aristida mandoniana Henr. Med. Rijks Herb. Leiden 40: 55. 1921. (*Mandon* 1277.)

A densely tufted, glabrous annual, the slender wiry culms ascending or erect from a geniculate base, freely branching from the lower nodes, the narrow blades commonly involute, the nodding or erect panicles about 10 to 15 cm. long, the slender branches short, appressed, or sometimes the lower 5 cm. long or more, spreading and flexuous, the spikelets short-pediceled, mostly clustered, the equal awns 12 to 20 cm. long. Extremely variable in appearance, ranging from dwarf plants with narrow compact panicles to larger plants, as much as 70 cm. tall, with flexuous panicles.

Open dry ground and waste places, throughout the warmer parts of America and the Old World. Originally described from the island of Ascencion.

ECUADOR: Riobamba, *Mille* 247; *Spruce* 5918 (Kew Herb.). Huigra, *Rose* 22419, 24024. Between Huigra and Naranjapata, *Hitchcock* 20661. Alausí, *Hitchcock* 20687. Between La Toma and Loja, *Hitchcock* 21398, 21404. Between Portovelo and El Tambo, *Hitchcock*, 21293. Chanduy, *Spruce* 6435 (Kew Herb.).

PERU: Obrajillo, *Wilkes Expl. Exped.* Huánuco, *Macbride* 3511, 3513. Ambo, *Macbride* 3177. Matucana, *Macbride & Featherstone* 220, 342. Chosica, *Macbride & Featherstone* 543. Arequipa, *Rose* 18802; *Holway* 770, 771. Tarma, *Hitchcock* 22168. Ollantaytambo, *Hitchcock* 22553; *Cook & Gilbert* 520. Cotahuasi, *Weberbauer* 5938, 6867 (both in Field Mus.). Prov. Piura, *Weberbauer* 5963 (Field Mus.). Torata, *Weberbauer* 7410. Near Pisco, *Weberbauer* 5380 (Field Mus.).

BOLIVIA: La Paz, *Buchtien* 551, 2493; *Holway* 489. Sorata, *Mandon* 1277. Cotaña, *Buchtien* 208, 3129. Cochabamba, *Hitchcock* 22817. Tarija, *Fries* 1065. Chaco, *Fries* 1472. Chiguana, *Asplund* 6540.

3. Aristida schiedeana Trin. & Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. 5[1]: 120. 1842.

An erect perennial as much as 1 meter tall with flat blades (curled or flexuous with age) and open panicles, the distant branches spreading, naked below, the spikelets appressed along the upper part of the branchlets; column twisted; lateral awns obsolete.

Dry grassy slopes, Texas to Ecuador. Originally described from Mexico.

ECUADOR: Huigra, *Hitchcock* 20765. Between La Toma and Loja, *Hitchcock* 21408.

4. Aristida implexa Trin. Mém. Acad. St. Pétersb. VI Sci. Nat. 2[1]: 48. 1836.

A rather stout erect perennial 40 to 60 cm. tall, with flat or loosely involute blades, densely pilose above near base, and dense narrow panicles 15 to 20 cm. long, the twisted column of the awns 2 to 3 cm. long, the awns 3 to 5 cm. long.

Grassy plains, Brazil, whence originally described, to Paraguay and Bolivia.

BOLIVIA: Buena Vista, *Steinbach* 5352, 7029.

5. Aristida riparia Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 2[1]: 48. 1836.

An erect cespitose perennial about 80 cm. tall with rather thick blades, flat on the main culms, involute on the innovations, and narrow compact panicles 8 to 15 cm. long; glumes about equal, awned; lemma about 6 mm. long, extending into a twisted beak or column about 1 cm. long, the base of callus 2-toothed; awns about equal, 1.5 to 2 cm. long.

Grassy plains, Brazil, whence originally described, to Paraguay and Bolivia.

BOLIVIA: Chulumani, *Hitchcock* 22702.

6. Aristida mendocina R. A. Phil. Anal. Univ. Chil. **36**: 205. 1870.

Aristida cordobensis Hack.; Stuck. Anal. Mus. Nac. Buenos Aires **11**: 91. 1904.

Aristida inversa Hack. in Fries, Ark. för Bot. **8**: 37. 1908.

A slender cespitose perennial 30 to 60 cm. tall, with loosely involute blades and narrow, rather loose panicles 10 to 20 cm. long, the branches ascending; glumes obtuse, very unequal, the first about 9 mm. long, the second 2 to 3 mm. long; lemma a little shorter than the first glume, compressed toward the summit; awns nearly equal, about 2 cm. long.

Grassy plains and hills, Argentina to Bolivia. Originally described from northern Argentina.

BOLIVIA: Gran Chaco, Fortin Crevaux ad Río Pilcomayo, *Fries* 1589.

7. Aristida spadicea H. B. K. Nov. Gen. & Sp. **1**: 123. 1816.

Aristida oligophylla Pilger, Bot. Jahrb. Engler **25**: 711. 1898. (*Stübel* 153.)

An erect cespitose perennial 50 to 100 cm. tall, with flat blades becoming flexuous with age, and open panicles with few distant spreading branches, the spikelets appressed along the upper parts of the branchlets; glumes about equal, 8 to 12 mm. long, awn-pointed; lemmas 10 to 15 mm. long, including the twisted summit 3 to 5 mm. long; awns 10 to 15 mm. long, the lateral shorter than the central.

Plains and grassy slopes, Mexico to Ecuador. Originally described from Mexico, Venezuela, and Guayaquil. (*Bonpland.*)

ECUADOR: Alausí, *Hitchcock* 20716. Quito, *Jameson* 107 (Kew Herb.). Prov. Imbabura, *Stübel* 153.

8. Aristida setifolia H. B. K. Nov. Gen. & Sp. **1**: 122. 1816.

Aristida tarapotana Mez, Repert. Nov. Sp. Fedde **17**: 151. 1921. (Tarapoto, *Spruce.*)

An erect or spreading, cespitose perennial, mostly 10 to 30 cm. tall, rather delicate, with short involute sharp-pointed blades, and loose narrow panicles 10 to 15 cm. long; glumes somewhat unequal; lemma about 6 mm. long, the equal awns 10 to 15 mm. long, spirally contorted at base.

Open ground. Colombia to Brazil and Peru. Originally described from Venezuela.

PERU: Paita, *Safford* 14. Tarapoto, *Spruce* 4526 (Kew Herb.).

The Tarapoto specimen, which is immature, may represent a distinct species. More material is needed to determine this. The awns are longer than usual in *A. setifolia.* Mez cites a Spruce specimen from Tarapoto (see *A. tarapotana* above) without number. This is probably no. 4526.

9. Aristida marginalis Ekman, Ark. för Bot. **10**[17]: 23. *pl. 3, 6.* 1911.

An erect cespitose perennial 50 to 100 cm. tall, with flat blades, flexuous with age, and rather loose and narrow, more or less nodding panicles 10 to 20 cm. long, the branches ascending; glumes about equal, 5 to 7 mm. long; lemma about 8 mm. long, including the narrowed and slightly twisted summit; awns about equal, 8 to 15 mm. long.

Grassy plains and slopes, Colombia to Paraguay. Originally described from Brazil.

ECUADOR: Huigra, *Hitchcock* 20761. Between Portovelo and El Tambo, *Hitchcock* 21305. Between El Tambo and La Toma, *Hitchcock* 21353.

10. Aristida enodis Hack. Repert. Nov. Sp. Fedde **11**: 21. 1912.

Aristida antoniana Steud.; Lechl. Berb. Amer. Austr. 56. 1857, name only. (*Lechler* 1774.)

Aristida pflanzii Mez, Repert. Nov. Sp. Fedde **17**: 151. 1921. (*Pflanz*, Bolivia.)

An erect cespitose perennial 10 to 40 cm. tall, with involute blades and compact, mostly purple panicles 3 to 8 cm. long; glumes equal, mucronate, about 1 cm. long; lemma about 1 cm. long, including the short slightly twisted summit; awns spreading, 1 to 1.5 cm. long, the central a little longer than the lateral.

Alpine slopes and punas, Peru and Bolivia, whence originally described. (Type, *Buchtien* 2540.)

PERU: Oroya, *Macbride & Featherstone* 983. Yanahuanca, *Macbride & Featherstone* 1254. Azángaro, *Lechler* 1774 (Kew Herb.).

BOLIVIA: Palca, *Buchtien* 2540. Viacha, *Buchtien* 857. Isla del Sol, *Asplund* 6541. General Campero, *Asplund* 6542. Sorata, *Mandon* 1277 (Kew Herb.). Buena Vista, *Steinbach* 6807.

ARISTIDA ASPLUNDII Henr. Med. Rijks Herb. Leiden **54**: 42. 1926. Type, *Asplund* 2525, collected at Ullama, near Calacoto, Bolivia. Other specimens cited are *Asplund* 2787 from the same Province, and *Buchtien* 857, included above under *A. enodis*. I have not seen the Asplund specimens.

11. Aristida circinalis Lindm. Svensk. Vet. Akad. Handl. **34**[6]: 13. *pl.* 7*a*. 1900.

An erect slender cespitose perennial 50 to 80 cm. tall, with mostly basal, elongate blades, flat below, ending in a slender involute flexuous point, the panicles narrow but rather loose, 10 to 20 cm. long; glumes about equal, acute or mucronate, about 7 mm. long; lemma about as long as or a little shorter than the glumes, including a thickish scarcely twisted beak of 3 to 4 mm.; awns spreading, slightly spiral or contorted at base, about equal, mostly 1.5 to 2.5 cm. long.

Grassy slopes, Brazil to Bolivia. Originally described from Rio Grande do Sul.

BOLIVIA: Chulumani, *Hitchcock* 22711. Coripata, *Hitchcock* 22676.

ARISTIDA FRIESII Henr. Med. Rijks Herb. Leiden **54**: 186. 1926. Type, *Fries* 1301a, collected at Junaca near Tarija. I have not seen this specimen. The species appears to be allied to *A. circinalis*.

12. Aristida complanata Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. **1**: 85. 1830.

Aristida leptochaeta Hack. Repert. Nov. Sp. Fedde **6**: 344. 1909.

Aristida teretifolia Arech. Anal. Mus. Nac. Montevideo **4**: 79. *pl.* 4. 1903.

Aristida longiramea var. *boliviana* Henr. Med. Rijks Herb. Leiden **40**: 56. 1921. (*Herzog* 1442.)

An erect cespitose perennial 30 to 50 cm. tall, with flat blades becoming flexuous with age, and narrow, somewhat interrupted panicles 10 to 20 cm. long; glumes nearly equal, a little more than 1 cm. long, the lemma a little shorter; awns about equal, 2 to 3 cm. long.

Grassy plains, Brazil, whence originally described, to Paraguay and Bolivia.

BOLIVIA: Cochabamba, *Holway* in 1920. Buena Vista, *Steinbach* 5355. Between Río Piray and Río Cuchi, *Herzog* 1442.

ARISTIDA CRINITA Presl, Rel. Haenk. **1**: 223. 1830. The habitat of this species is given as "in arenosis Peruviae." The type specimen at the German University, Prague, is *Aristida murina* Cav., and the label bears no data as to locality. *Aristida murina* is found in Uruguay and Argentina but is not known from Peru. The published locality is probably an error.

60. NAZIA Adans.

Spikelets in clusters of 2 (in our species), their flat faces contiguous, their second glumes outermost, strongly convex, covered with stout uncinate spines.

1. **Nazia aliena** (Spreng.) Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 17: 28. *f. 324.* 1899.

Lappago aliena Spreng. Neu. Entd. 3: 15. 1822.

A low spreading annual, with flat ciliate blades and spikes of small crowded burs.

Open arid ground, southwestern United States and the West Indies to Argentina; also Asia and Africa. Originally described from Brazil.

ECUADOR: Chanduy, *Spruce* 6441. Without locality, *Spruce* 5802, (both Kew Herb.).

PERU: Matucana, *Macbride & Featherstone* 343. Between Río de los Trancas and Llaxwa, *Hrdlička* in 1913. Mollendo, *Hitchcock* 22352.

BOLIVIA: Milluhuaya, *Buchtien* 4176. Chulumani, *Hitchcock* 22649. Sorata, *Mandon* 1268 (Kew Herb.).

61. ANTHEPHORA Schreb.

Spikelets in clusters of 4, the indurate first glumes united at base, forming a pitcher-shaped pseudo-involucre, the clusters subsessile and erect on a slender flexuous continuous axis.

1. **Anthephora hermaphrodita** (L.) Kuntze, Rev. Gen. Pl. 2: 759. 1891.

Tripsacum hermaphroditum L. Syst. Nat. ed. 10. 2: 1261. 1759.

Anthephora elegans Schreb. Beschr. Gräs. 2: 105. 1810.

A leafy, ascending or decumbent, branching annual, with flat thin blades, the erect spikes 5 to 10 cm. long.

A common weed in the lowlands of tropical America. Originally described from Jamaica.

ECUADOR: Oil Camp between Guayaquil and Salinas, *Hitchcock* 20032. Chanduy, *Spruce* 6440 (Kew Herb.). Without locality, *Jameson* 350 (Kew Herb.).

PERU: Tarapoto, *Spruce* 4402 (Kew Herb.). Near Piura, *Weberbauer* 5950 (Field Mus.).

62. AEGOPOGON Humb. & Bonpl.

Spikelets short-pedicellate, in groups of 3, the groups short-pedunculate, spreading, the peduncle disarticulating from the axis and forming a pointed stipe below the group, this falling entire; central spikelet short-pedicellate, fertile, the 2 lateral ones longer-pedicellate and staminate or neuter; glumes membranaceous, notched at apex, the mid nerve extending into a point or awn; lemma and palea thinner than the glumes, extending beyond them, the lemma 3-nerved, the central nerve and sometimes also the lateral ones extending into awns, the palea 2-awned.

Spikelets in groups of 3 ..... 1. A. cenchroides.
Spikelets in groups of 2 ..... 2. A. bryophilus.

1. **Aegopogon cenchroides** Humb. & Bonpl.; Willd. Sp. Pl. 4: 899. 1806.

Aegopogon pusillus Beauv. Ess. Agrost. 122. *pl. 22. f. 4.* 1812. (Said to be from Peru.)

Aegopogon submutious Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. 4¹: 25. 1840. (*Haenke*, Peru?)

A delicate spreading much-branched annual, with flat blades 2 to 4 cm. long and 1 to 2 mm. wide, and 1-sided racemes 2 to 3 cm. long, the clusters of purplish spikelets on short flexuous pedicels.

Damp cliffs, walls, and banks, Mexico to Bolivia. Originally described from Venezuela.

In dry open places the tufts are 10 to 30 cm. tall; in damp shady places the slender culms may be a meter long.

ECUADOR: Tulcán *Hitchcock* 21026. Otavalo, *Hitchcock* 20819. Quito, *Jameson* 630; *Harteman* 26, 56; *Mille* 242; *Holway* 914; *Spruce* 5408 (Kew Herb.). Baños, *Hitchcock* 21922; *Tate* 600. Between La Toma and Loja, *Hitchcock* 21419. Alausí, *Hitchcock* 20717. Cuenca, *Rose* 22887. Between Loja and Portovelo, *Rose* 23318.

PERU: Ollantaytambo, *Cook & Gilbert* 699. Huánuco, *Macbride & Featherstone* 2118. Mito, *Macbride & Featherstone* 1427. Tarma, *Hitchcock* 22155. Cuzco, *Hitchcock* 22465.

BOLIVIA: Sorata, *Holway* 535; *Mandon* 1296 (Kew Herb.); *Rusby* 200. Unduavi, *Buchtien* 2578. Cochabamba, *Hitchcock* 22820, 22843.

2. Aegopogon bryophilus Doell in Mart. Fl. Bras. **2**[3]: 239. 1880.

Aegopogon geminiflorus var. *muticus* Pilger, Bot. Jahrb. Engler **27**: 25. 1899. (*Bang* 1307.)

Aegopogon argentinus Mez, Repert. Nov. Sp. Fedde **17**: 145. 1921.

Aegopogon fiebrigii Mez, Repert. Nov. Sp. Fedde **17**: 145. 1921. (*Fiebrig* 2865.)

Differing from *A. cenchroides* in having but 2 spikelets in the group, one sessile and normally developed, the other pediceled and much reduced.

Moist cliffs, Brazil, whence originally described, to Argentina and Bolivia.

PERU: Matucana, *Macbride & Featherstone* 186.

BOLIVIA: San Felipe, *Hitchcock* 22603. Sorata, *Bang* 1307. Hacienda Casana, *Buchtien* 7144. Camacho, *Fiebrig* 2865.

All the forms of *Aegopogon* are probably to be referred to *A. cenchroides*. The glumes are variable in shape and size. *A. bryophilus* and *A. argentinus* are like *A. geminiflorus muticus*, and *A. geminiflorus* appears to be a form of *A. cenchroides* with 2 spikelets in each cluster. *A. fiebrigii* is still more reduced, both lateral spikelets being absent or reduced. *A. tenellus* (Cav.) DC. of Mexico is more distinct, but the distinctions are not well-marked nor constant.

63. LEPTOCHLOA Beauv.

Spikelets few to many-flowered, short-pedicellate, appressed, loosely imbricate along a narrow rachis, forming slender racemes, these numerous in an elongate panicle; glumes and lemmas keeled, the lemmas 3-nerved, glabrous or sometimes minutely pubescent on the nerves, not villous; uppermost lemma reduced, awnless.

Plants annual; spikelets awnless.

Sheaths at least the upper, papillose-hispid ..... 1. L. filiformis.

Sheaths glabrous, or scabrous only.

Sheaths minutely scabrous; racemes distinctly 1-sided; lemma narrowed at summit ..... 2. L. scabra.

Sheaths glabrous or nearly so; racemes indistinctly 1-sided, lemmas broad and dentate at summit ..... 3. L. uninervia.

Plants perennial; spikelets awned or awnless.

Racemes few, spreading or finally deflexed; lemmas broad, notched at apex, the lateral nerves glabrous ..... 4. L. dubia.

Racemes several to numerous; lemmas acute or awned, the lateral nerves pubescent.

Lemmas awnless or nearly so; plant smooth and glaucous__5. **L. virgata.**
Lemmas awned; sheaths and blades sparsely pilose, not glaucous.
6. L. domingensis.

1. Leptochloa filiformis (Lam.) Beauv. Ess. Agrost. 71, 166. 1812.
Festuca filiformis Lam. Tabl. Encycl. 1: 191. 1791.
Leptochloa mucronata Kunth, Rév. Gram. 1: 91. 1829.
Culms ascending or erect, geniculate below, branching at the base, commonly 40 to 70 cm. tall (dwarf specimens 10 to 20 cm. tall); blades thin, flat; racemes very slender, spreading.

Fields and open ground, southern United States to Argentina, at low altitudes. Originally described from tropical America.

ECUADOR: Guayaquil, *Mille* 23. Oil Camp between Guayaquil and Salinas, *Hitchcock* 20107. Milagro, *Hitchcock* 20163. Chanduy, *Spruce* 6442 (Kew Herb.).

2. Leptochloa scabra Nees, Agrost. Bras. 435. 1829.

A stout, rather succulent annual as much as 1 meter tall, with scabrous sheaths, flat blades, and narrow panicles as much as 30 cm. long; racemes closely arranged, ascending, somewhat flexuous, 3 to 8 cm. long.

Ditches and shallow marshes, southern United States to Paraguay. Originally described from Brazil.

ECUADOR: Milagro, *Hitchcock* 20172.

3. Leptochloa uninervia (Presl) Hitchc. & Chase, Contr. U. S. Nat. Herb. **18**: 383. 1917.
Megastachya uninervia Presl, Rel. Haenk. 1: 283. 1830.
Diplachne verticillata Nees & Mey. Nov. Act. Acad. Caes. Leop. Carol. **19**: Suppl. 1: 27. 1841; 158. 1843.
Festuca glycerioides Steud.: Lechl. Berb. Amer. Austr. 56. 1857, name only. (Tacna, *Lechler* 1574.)
Leptochloa imbricata Thurb. in S. Wats. Bot. Calif. **2**: 293. 1880.
Diplachne tarapacana Phil. Anal. Mus. Nac. Chile Bot. **8**: 88. 1891.
Diplachne carinata Hack. Bol. Acad. Cienc. Córdoba **16**: 253. 1900.

A rather stout and somewhat succulent annual, with numerous erect or decumbent culms 30 to 60 or even 100 cm. tall, slightly roughened sheaths, and narrow panicles 7 to 15 cm. long; racemes ascending or finally spreading, rather closely arranged, single or somewhat aggregate, pale or lead-colored, 2 to 5 cm. long or sometimes longer.

Ditches and wet open ground, southwestern United States and Mexico; Peru to Argentina and Chile. Originally described from Mexico.

PERU: Huánuco, *Macbride & Featherstone* 2443. Lima, *Wilkes Expl. Exped.*
BOLIVIA: Milluhuaya, *Buchtien* 4257.

4. Leptochloa dubia (H. B. K.) Nees, Syll. Pl. Ratisb. **1**: 4. 1824.
Chloris dubia H. B. K. Nov. Gen. & Sp. **1**: 169. 1816.
Schismus patens Presl, Rel. Haenk. 1: 269. 1830.
Ipnum mendocinum R. A. Phil. Anal. Univ. Chile **36**: 211. 1870.
Diplachne mendocina Kurtz, Bol. Acad. Sci. Córdoba **15**: 521. 1897.

A rather slender perennial, 40 to 80 cm. tall, with flat blades and pyramidal lead-colored panicles 8 to 15 cm. long; racemes few, spreading or finally deflexed, 2 to 6 cm. long, rather distant.

Dry plains and hills, southern United States and Mexico; Bolivia to Argentina and Chile. Originally described from Mexico.

BOLIVIA: Comarapa, *Herzog* 1925. Tarija, *Fries* 1094. Cotaña, *Buchtien* 3136, 3137 (Kew Herb.).

5. Leptochloa virgata (L.) Beauv. Ess. Agrost. 166. 1812.

Cynosurus virgatus L. Syst. Nat. ed. 10. 2: 87. 1759.

Chloris poaeformis H. B. K. Nov. Gen. & Sp. 1: 169. 1816. (Colombia and Guayaquil.)

Culms in small tufts, tall, slender, strong and wiry, sparingly branching; blades flat; racemes commonly about 10 cm. long, lax, ascending, aggregate toward the summit of the culm.

Open ground and grassy slopes, Mexico and the West Indies to Argentina. Originally described from Jamaica.

ECUADOR: Portovelo, *Hitchcock* 21252, *Rose* 23441. Milagro, *Hitchcock* 20285.

BOLIVIA: Río Surutú, *Steinbach* 6834.

6. Leptochloa domingensis (Jacq.) Trin. Fund. Agrost. 133. 1820.

Cynosurus domingensis Jacq. Misc. Austr. 2: 363. 1781.

Resembling *L. virgata*, the panicles more elongate, the racemes shorter and more numerous.

Open ground and grassy banks, Florida and Mexico to Paraguay. Original locality not given, presumably Santo Domingo.

PERU: Colonia Perené, *Hitchcock* 22100, 22078.

BOLIVIA: Santa Cruz, *Herzog* 1464. Milluhuaya, *Buchtien* 4266. Coripata, *Hitchcock* 22692. Buena Vista, *Steinbach* 5222, 6868.

64. GOUINIA Fourn.

Spikelets few-flowered, short-pedicellate, appressed, in slender elongate racemes, these racemosely arranged; glumes and lemmas keeled, the lemmas densely villous on the nerves, awned, the uppermost much reduced but awned.

Racemes floriferous to base ..... 1. G. virgata.
Racemes naked at base for several centimeters ..... 2. G. latifolia.

1. Gouinia virgata (Presl) Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 10. 1897.

Bromus virgatus Presl, Rel. Haenk. 1: 263. 1830.

Pogochloa brasiliensis Moore, Trans. Linn. Soc. Bot. II. 4: 509. *pl. 37. f. 9–23.* 1895.

An erect wiry perennial about 1 meter tall, with flat blades and large open panicles of 5 to 8 distant spreading racemes at much as 15 cm. long, floriferous to base, the spikelets appressed and somewhat imbricate.

Dry plains and hills, Mexico to Colombia; Bolivia to Brazil. Originally described from Peru and Mexico (*Haenke*).

PERU: Mountains of Huánuco, *Haenke* (fragment from the type).

BOLIVIA: Gran Chaco, *Fries* 1470.

2. Gouinia latifolia (Griseb.) Vasey, Contr. U. S. Nat. Herb. 1: 365. 1895.

Tricuspis latifolia Griseb. Abh. Ges. Wiss. Göttingen 19: 259. 1874.

An erect robust tufted perennial 1 to 1.5 meters tall, with flat blades 1 to 1.5 cm. wide and open panicles 20 to 30 cm. long, the racemes slender, distant, spreading, as much as 15 cm. long, naked on the lower half.

Grassy slopes, Bolivia to Argentina, whence originally described.

BOLIVIA: Chulumani, *Hitchcock* 22650.

65. TRIPOGON Roem. & Schult.

Spikelets several to many-flowered, sessile, erect in a single spike; glumes shorter than the lowermost floret; lemmas awned from between the lobes of the minutely two-lobed summit.

1. **Tripogon spicatus** (Nees) Ekman, Ark. för Bot. 11[4]: 36. 1912.

Bromus spicatus Nees, Agrost. Bras. 471. 1829.

Tricuspis simplex Griseb. Mem. Amer. Acad. n. ser. 8: 532. 1862.

A low, densely tufted perennial, the subfiliform leaves aggregate at the base, the slender culms erect, the spike about half the entire height of the plant.

Sterile hills, Texas to Mexico; Peru to Brazil and Argentina. Originally described from Brazil.

PERU: Matucana, *Macbride & Featherstone* 329. San Bartolomé, *Weberbauer* 5311 (Field Mus.).

BOLIVIA: Between Río Piray and Río Cuchi, *Herzog* 1449.

66. ELEUSINE Gaertn.

Spikelets several-flowered, densely imbricate in thick spikes, these subdigitate; glumes and lemmas with thickened 5-nerved keels, acute; caryopsis with a thin pericarp marked with fine transverse lines.

1. **Eleusine indica** (L.) Gaertn. Fruct. & Sem. 1: 8. 1788.

Cynosurus indicus L. Sp. Pl. 72. 1753.

A weedy annual, with spreading or ascending, flattened, branching culms, thin flat linear blades, and 2 to several spikes (sometimes one spike 1 to 3 cm. below) 5 to 10 cm. long.

Open ground and waste places. A common weed of warm and warm-temperate regions. Introduced in America; originally described from India.

ECUADOR: Guayaquil, *Mille* 292. Milagro, *Hitchcock* 20171.

PERU: Colonia Perené, *Hitchcock* 22065. La Merced, *Macbride* 5230.

BOLIVIA: Mapiri, *Rusby* 221; *Buchtien* 1163. Beni River, *Rusby* 207. Rurrenabaque, *Rusby* (*Mulford Expl. Exped.*) 818. Coroico, *Buchtien* 6419. Mulluhuaya, *Buchtien* 4194. Yanacachi, *Buchtien* 421. Near Tipuani, *Buchtien* 5332. Río Piray, *Herzog* 1434. Buena Vista, *Steinbach* 5149, 6837.

67. DACTYLOCTENIUM Willd.

Spikelets as in *Eleusine*, but the glumes and lemmas mucronate or awn-tipped; apex of the rachis extending as a point beyond the spikelets.

1. **Dactyloctenium aegyptium** (L.) Richt. Pl. Eur. 1: 68. 1870.

Cynosurus aegyptius L. Sp. Pl. 72. 1753.

A weedy, stoloniferous, more or less pilose annual, often forming dense mats, the flat culms 10 to 50 cm. long, the blades flat, usually short, the spikes 2 to 4, short, thick, radiate.

Open ground and waste places. A common weed in warm countries. Introduced in America. Originally described from "Africa, Asia, America."

ECUADOR: Oil Camp between Guayaquil and Salinas, *Hitchcock* 20006. Chanduy, *Spruce* (Kew Herb.).

BOLIVIA: Tarija, *Fries* 1091.

68. CYNODON L. Rich.

(*Capriola* Adans.[27])

Spikelets 1-flowered, sessile, imbricate, in slender unilateral spikes; glumes unequal, narrow, acute; lemma broad, boat-shaped, inclosing a palea of equal length.

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[27] Under the provisions of the Type-basis Code *Capriola* is not effectively published.

1. **Cynodon dactylon** (L.) Pers. Syn. Pl. 1: 85. 1805. BERMUDA GRASS.
Panicum dactylon L. Sp. Pl. 58. 1753.
Cynodon maritimus H. B. K. Nov. Gen. & Sp. 1: 170, 1816. (Seacoast of Peru.)
Digitaria maritima Spreng. Syst. Veg. 1: 272. 1825.
Cynodon erectus Presl, Rel. Haenk. 1: 290. 1830. (Mexico and Huánuco.)
Capriola dactylon Kuntze, Rev. Gen. Pl. 2: 764. 1891.
Cynodon dactylon var. *maritimus* Hack. in Fries, Ark. för Bot. 8: 40. 1909.
Capriola dactylon maritima Hitchc. U. S. Dept. Agr. Bull. 772: 179. 1920.

A low, extensively creeping perennial, with compressed wiry culms, narrow, usually short blades, and 3 to 5 slender arcuate-spreading spikes aggregate at the apex of the culms.

Common in open, rather dry ground in the warmer parts of both hemispheres; apparently introduced in America. Originally described from southern Europe. Often called hierba de la Virgen.

ECUADOR: Guayaquil, *Mille* 50, 291; *Sodiro* 241.

PERU: Lima, *Hitchcock* 22343; *Wilkes Expl. Exped.* Pacasmayo, *Rose* 18520. Chosica, *Macbride & Featherstone* 524.

BOLIVIA: Quebrada de Charagua, *Herzog* 1211.

69. MICROCHLOA R. Br.

Spikelets 1-flowered, awnless, in a single slender spike.

1. **Microchloa indica** (L. f.) Kuntze, Rev. Gen. Pl. 3²: 356. 1898.
Nardus indicus L. f. Suppl. Pl. 105. 1781.
Microchloa setacea R. Br. Prodr. Fl. Nov. Holl. 1: 208. 1810.

A low tufted annual mostly not over 15 cm. tall, with narrow, flat or folded, glabrous blades and slender, solitary, flexuous, or falcate spikes usually less than 10 cm. long.

Open ground, Colombia to Argentina; also in the tropics of the Old World. Originally described from India.

ECUADOR: Quito, *Sodiro* in 1894.

PERU: Matucana, *Macbride & Featherstone* 448.

BOLIVIA: La Paz, *Holway* 490. Cochabamba, *Holway* 361; *Hitchcock* 22824. Between Río Piray and Río Cuchi, *Herzog* 1448.

70. GYMNOPOGON Beauv.

Spikelets with 1 perfect floret and 1 to 3 sterile florets (mostly reduced to single awns) above it, or sometimes with 2 perfect florets; glumes equaling or exceeding the florets; fertile lemma narrow, long-awned; spikelets distant or approximate, appressed along a slender axis.

Spikes about 5 cm. long, aggregate near the summit of the culm; spikelet 2-flowered, the second floret similar to the first but smaller. ..... 1. G. jubiflorus.

Spikes 15 to 25 cm. long, distant along the upper part of the culm; spikelet with 1 perfect floret and a much-reduced second floret (rarely a rudimentary third) ..... 2. G. spicatus.

1. **Gymnopogon jubiflorus** Hitchc., sp. nov.

A slender, rather wiry perennial; culms glabrous, about 80 cm. tall; sheaths firmly clasping the culm; ligule membranaceous, less than 0.5 mm. long; blades firm, flat, narrowly lanceolate, the larger along the middle of the culm as much as 5 cm. long and 4 mm. wide, the upper and lower reduced; panicle brownish, somewhat nodding, about 8 cm. long, consisting of about 10 slender spikes 5 to

6 cm. long, floriferous to the base, on an axis about 2 cm. long; spikelets in 2 rows, rather closely imbricate, 2-flowered, the second floret somewhat reduced; glumes narrowly lanceolate, acuminate, slightly curved outward, scabrous on the keels, 3.5 to 4 mm. long, the second slightly longer than the first; first floret about 2 mm. long, the lemma nerveless, slightly compressed, with a tuft of fine hairs about 1.5 mm. long at the tip, otherwise glabrous, the margin inrolled and partially inclosing the rachilla joint; awn slender, flexuous, about 8 mm. long; palea obtuse, about as long as the lemma; rachilla joint slender, glabrous, about 1 mm. long; second floret similar to the first, a little more than 1 mm. long, the hairs at summit about 1 mm. long, the awn nearly as long as that of the first floret.

Type in the U. S. National Herbarium, no. 879400, collected at Guanay, northern Bolivia, altitude 600 meters, May, 1886, by H. H. Rusby (no. 215).

This species is allied to *Monochaete fastigiata* Doell (*Gymnopogon fastigiatus* Nees). In that the rachilla joint is nearly as long as the floret, the hairs at the summit of the lemma are scarcely 0.5 mm. long, the blades are narrower, and the spikes fewer, shorter, and more slender. In the specimens of *M. fastigiata* examined there is no second floret.

The descriptions of *Monochaete fastigiata* state that the rachilla is not prolonged behind the floret, but in the specimens examined the prolongation is very evident, though partially concealed by the keels of the palea. It is doubtful if *Monochaete* should be maintained as a distinct genus.

2. Gymnopogon spicatus (Spreng.) Kuntze, Rev. Gen. Pl. 3 [2]: 354. 1898.

Polypogon spicatus Spreng. Syst. Veg. 1: 243. 1825.

Gymnopogon laevis Nees, Agrost. Bras. 428. 1829.

A loosely cespitose perennial from knotty crowns, with slender, wiry, erect or spreading culms 30 to 50 cm. tall, rigid spreading blades 2 to 4 cm. long, and slender, rather distant spikes 10 to 15 cm. long; spikelets usually rather distant, especially below, 2-flowered, with the second floret reduced to an awned rudiment, or 3-flowered, the second floret somewhat reduced, the third an awned rudiment; awns about 1 cm. long.

Open slopes, Colombia and Venezuela to Argentina. Originally described from Brazil.

BOLIVIA: Buena Vista, *Steinbach* 5386, 6977.

71. CHLORIS Swartz. FINGERGRASS

Spikelets with 1 perfect floret, sessile along a slender rachis, forming unilateral spikes, these digitate or nearly so; glumes unequal; lemma awned or mucronate; rachilla prolonged behind the palea and bearing 1 to few rudimentary awned sterile lemmas.

Lemmas awnless; spikes dark brown. (EUSTACHYS) ____1. C. distichophylla.
Lemmas awned; spikes pale or purplish.
  Sterile floret broadest at the summit, truncate.
    Plants perennial; spikes flexuous _____2. C. polydactyla.
    Plants annual; spikes straight _____3. C. virgata.
  Sterile floret narrow, the apex acute or subacute.
    Plants perennial, stoloniferous; spikes finally spreading or reflexed.
      4. C. beyrichiana.
    Plants annual, not stoloniferous; spikes erect or ascending.
      Florets 2 to 3 mm. long, compressed _____5. C. radiata.
      Florets 4 mm. long, terete, very narrow _____6. C. angustiflora.

1. Chloris distichophylla Lag. Gen. & Sp. Nov. 4. 1816.

?Chloris paytensis Steud. Syn. Pl. Glum. 1: 207. 1854. (Payta, Peru.)

An erect, rather stout perennial as much as 1 meter tall, with compressed keeled sheaths, short obtuse flat blades as much as 1 cm. wide, and numerous flexuous spikes 7 to 14 cm. long.

Open ground, fields, and waste places, Brazil to Argentina, whence originally described, and Peru.

PERU: Tarapoto, *Spruce* 4911. Santa Ana, *Cook & Gilbert* 1532, 1576.

BOLIVIA: Reyes, *Rusby* (*Mulford Biol. Expl.*) 1319. Coroico, *Buchtien* 3633. Milluhuaya, *Buchtien* 4195. Coripata, *Hitchcock* 22677. San José, *Hitchcock* 22736. Sirupaya, *Buchtien* 6424. La Florida, *Holway* 677; *Hitchcock* 22635. Chulumani, *Hitchcock* 22663. Yungas, *Bang* 267. Buena Vista, *Steinbach* 5359, 6867.

2. Chloris polydactyla (L.) Swartz, Prodr. Veg. Ind. Occ. 26. 1788.

Andropogon polydactylon L. Sp. Pl. ed. 2. 1483. 1763.

An erect perennial as much as 1 meter tall, with scarcely compressed or keeled sheaths, flat acuminate blades, and several (as many as 20) flexuous spikes mostly 8 to 12 cm. long.

Grassy slopes, fields and open ground, Florida and the West Indies to Paraguay. Originally described from Jamaica.

BOLIVIA: Guanay, *Rusby* 194. Cañamina, *Cárdenas* (*Mulford Biol. Expl.*) 299. Hacienda Anacuri, *Holway* 721. Milluhuaya, *Buchtien* 4279. Coripata, *Hitchcock* 22689, 22690. Chulumani, *Hitchcock* 22698. Cotaña, *Buchtien* 6423. Cochabamba, *Hitchcock* 22796, 22797.

3. Chloris virgata Swartz, Fl. Ind. Occ. 1: 203. 1797.

Chloris pubescens Lag. Var. Cienc. 2[4]: 143. 1805. (Peru.)

Chloris elegans H. B. K. Nov. Gen. & Sp. 1: 166. *pl. 47*. 1816.

Culms ascending, 20 to 40 cm. tall, scarcely compressed, the upper sheaths slightly inflated, glabrous in the throat; spikes mostly 5 or 6, suberect, somewhat flexuous in age, 3 to 5 cm. long; fertile lemma villous on the keel to a little below the summit.

Open, mostly sterile ground, West Indies to Argentina. Orginally described from the island of Antigua.

ECUADOR: Between La Toma and Loja, *Hitchcock* 21403. Chanduy, *Spruce* 6437, 6439 (both Kew Herb.).

PERU: Obrajillo, *Wilkes Expl. Exped.* Matucana, *Macbride & Featherstone* 222. Prov. Piura, *Weberbauer* 5964 (Field Mus.).

BOLIVIA: Cochabamba, *Buchtien* 2512; *Hitchcock* 22788, 22842. Tarija, *Fries* 1059.

4. Chloris beyrichiana Kunth, Rév. Gram. 1: 89, 289. 1829; 2: *pl. 56*. 1830.

A stoloniferous perennial, with erect flowering culms 20 to 40 cm. tall, short, flat or folded, obtuse blades, and 6 to 10 spikes 5 to 8 cm. long in 1 or 2 whorls.

Open ground, Ecuador to Argentina. Originally described from Brazil.

ECUADOR: Between La Toma and Loja, *Hitchcock* 21409.

PERU: Mito, *Macbride* 3331. Ollantaytambo, *Hitchcock* 22552. Cuzco, *Hitchcock* 22492.

BOLIVIA: Sorata, *Mandon* 1323. La Paz, *Bang* 82; *Rusby* 14; *Buchtien* 573. Palca, *Pflanz* 2526; *Hitchcock* 22584. Cochabamba, *Hitchcock* 22789, 22811, 22816, 22845; *Holway* 322. Samaipata, *Herzog* 1669. Tarija, *Fries* 1060.

5. Chloris radiata (L.) Swartz, Prodr. Veg. Ind. Occ. 26. 1788.

Agrostis radiata L. Syst. Nat. ed. 10. 2: 879. 1759.

A weedy branching decumbent-ascending annual, the sheaths broad, compressed, the blades thin, flat or folded, scaberulous or sparsely pilose, the slender spikes somewhat flexuous.

Ditches and waste places, southern Mexico and the West Indies to Paraguay. Originally described from Jamaica.

ECUADOR: Balao, *Eggers* 14630. Guayaquil, *Hitchcock* 19917. Milagro, *Hitchcock* 20178. Between Guayaquil and Salinas, *Hitchcock* 19990. Cashurco, *Hitchcock* 21895. San Nicolás, *Sodiro* 290. Alausí, *Hitchcock* 20695. Without locality, *Jameson* 349 (Kew Herb.).

PERU: Piura, *Spruce* 6438 (Kew Herb.). Lima, *Hitchcock* 22345; *Wilkes Expl. Exped.* Santa Clara, *Rose* 18617. Chosica, *Macbride & Featherstone* 552. Colonia Perené, *Hitchcock* 22097. Without locality, *Lechler* 2478.

BOLIVIA: Coripata, *Hitchcock* 22679; *Bang* 2173. Coroico, *Buchtien* 3631.

6. Chloris angustiflora Areschoug, Svensk. Freg. Eugenies Resa 118. 1910; Repert. Nov. Sp. Fedde **10**: 300. 1912.

Chloris leptantha Hitchc. in Urban, Symb. Antill. **7**: 166. 1912.

Chloris luetzelburgii Hitchc. Proc. Biol. Soc. Washington **36**: 197. 1923.

A slender tufted annual as much as 1 meter tall, with short flat acuminate blades and 5 to 8 slender spikes 6 to 12 cm. long, scattered on an axis as much as 5 cm. long; slender cleistogamous panicles also borne in the sheaths.

Open ground, fields, and waste places, West Indies to Ecuador and Brazil. Originally described from Guayaquil. (*Andersson.*)

ECUADOR: Oil Camp between Guayaquil and Salinas, *Hitchcock* 20056, 20064. Chanduy, *Spruce* 6436. Guayaquil, *Jameson* 393 (Kew Herb.).

The Brazilian specimens, described as *C. luetzelburgii*, are as much as 1 meter tall with spikes as much as 10 cm. long, while the original specimens of *C. leptantha* from the island of Bonaire are about 30 cm. tall with spikes about 5 cm. long. The Ecuador specimens are intermediate. The variation of the spikes and spikelets appears to be sufficient to warrant the inclusion of the two forms in one species.

72. TRICHLORIS Fourn.

Spikelets 2 to 5-flowered, similar to those of *Chloris;* fertile lemma 3-awned,, the lateral awns sometimes reduced. Perennials with several erect spikes feathery with the numerous awns.

Spikelets 2-flowered, both lemmas with 3 long awns_____**1. T. mendocina.**
Spikelets 3 to 5-flowered, the lateral awns of the lemmas more or less reduced, sometimes wanting_____**2. T. pluriflora.**

1. Trichloris mendocina (Phil.) Kurtz, Mem. Fac. Cienc. Exact. Univ. Córdoba **1897**: 37. 1897.

Chloris mendocina R. A. Phil. Anal. Univ. Chile **36**: 208. 1870.

A tufted perennial with erect or decumbent culms 40 to 60 cm. tall, narrow, flat or folded blades, and several erect purplish feathery spikes 6 to 12 cm. long.

Dry slopes, southwestern United States and Mexico; Bolivia to Argentina. Originally described from Mendoza, Argentina.

BOLIVIA: Mataral, *Herzog* 1804.

2. Trichloris pluriflora Fourn. Mex. Pl. **2**: 142. 1886.

A sometimes rather woody perennial 1 meter or more tall, with flat blades and several erect spikes 5 to 10 cm. long on an axis 2 to 4 cm. long.

Dry slopes, Texas and Mexico; Ecuador to Argentina. Originally described from Mexico.

ECUADOR: Between La Toma and Loja, *Hitchcock* 21400.

BOLIVIA: Comarapa, *Herzog* 1928.

73. BOUTELOUA Lag.[28] GRAMA

Spikelets with 1 perfect floret, crowded along one side of a narrow rachis, forming short spikes (rarely but a single spikelet to a spike); glumes unequal; fertile lemma rather broad, usually 3 to 5-toothed, commonly mucronate or awned; sterile lemmas usually with 3 awns; spikes racemose, often drooping.

Spike solitary, persistent, the florets falling. A low spreading annual.
1. B. simplex.

Spikes few to many, falling entire.

Spikes 2 to 4 with numerous purple awns 2 to 3 cm. long. Plants perennial.
2. B. megapotamica.

Spikes several to many.

Rachis with a sharp retrorsely bearded point at base----**3. B. aristidoides.**

Rachis not sharp-pointed at base.

Plants perennial, erect----**4. B. curtipendula.**

Plants annual.

Spikes 5 to 20, about 1 cm. long, excluding the awns, these about as long as the spikelets----**5. B. disticha.**

Spikes usually more than 20 in well-developed plants, about 5 mm. long, excluding the awns, these mostly less than 5 mm. long, sometimes very short----**6. B. pilosa.**

1. Bouteloua simplex Lag. Var. Cienc. **2**[4]: 141. 1805.

Chondrosium humile H. B. K. Nov. Gen. & Sp. **1**: 175. *pl. 56.* 1816,[29] (Ecuador.)

Chondrosium simplex Kunth, Rév. Gram. **1**: 94. 1829.

Bouteloua simplex var. *actinochloides* Henr. Med. Rijks Herb. Leiden **40**: 65. 1921. (Cochypata, Bolivia, *Mandon* in Herb. Balansa, Leiden.)

A spreading annual, with decumbent culms mostly 10 to 20 cm. long, short narrow flat blades, and a single falcate spike about 1 to 3 cm. long.

Open ground, fields, and waste places, Ecuador to Argentina. Originally described from Peru.[30]

ECUADOR: Alausí, *Hitchcock* 20696. Tupigachi, *André* 3515. Riobamba, *Mille* 293; *Sodiro.* Without locality, *Spruce* 5922.

PERU: Obrajillo, *Wilkes Expl. Exped.* Matucana, *Macbride & Featherstone* 219. Huánuco, *Macbride* 3241. Tarma, *Hitchcock* 22167. Ollantaytambo, *Cook & Gilbert* 479. Cuzco, *Hitchcock* 22491. Lake Titicaca, *Meyen.* Azángaro, *Lechler* 1792 (Kew Herb.). Cotahuasi, *Weberbauer* 6868 (Field Mus.). Torata, *Weberbauer* 7413.

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[28] For a revision of *Bouteloua*, with full synonymy, see Griffiths. The grama grasses (Contr. U. S. Nat. Herb. **14**: 343–428. 1912).

[29] As synonyms are cited, *Chondrosium humile* Beauv. [Ess. Agrost. 41. 1812, name only.] and *Actinochloa humilis* Willd. "herb."

[30] No locality is given with the original description but in a later work (Gen. & Sp. Nov. 5. 1816) the locality is given as Peru.

BOLIVIA: Yungas, *Rusby* 34. La Paz, *Bang* 81; *Buchtien* 161, 161a. Chiguana, *Asplund* 6521. Cochabamba, *Hitchcock* 22819; *Holway* 359. Uyuni, *Asplund* 6522. Puna Patanca, southern Bolivia, *Fiebrig* 2629. Totora, *Herzog* 2037. Tarija, *Fries* 1058, 1058a. Sorata, *Mandon* 1325 (Kew Herb.).

2. Bouteloua megapotamica (Spreng.) Kuntze, Rev. Gen. Pl. **3²**: 341. 1893.
Pappophorum megapotamicum Spreng. Syst. Veg. **4:** Cur. Post. 34. 1827.
Eutriana multiseta Nees, Agrost. Bras. 413. 1829.
Bouteloua multiseta Griseb. Abh. Ges. Wiss. Göttingen **19**: 303. 1879.

A low tufted perennial, with spreading culms 10 to 20 cm. tall, short, flat, mostly basal blades, and 2 to 4 deflexed spikes, with 3 or 4 long-awned sterile lemmas.

Dry plains, southern Bolivia to Uruguay and Argentina. Originally described from Brazil.

BOLIVIA: Padcaya, *Fiebrig* 2552.

3. Bouteloua aristidoides (H. B. K.) Griseb. Fl. Brit. W. Ind. 537. 1864.
Dinebra aristidoides H. B. K. Nov. Gen. & Sp. **1**: 171. 1816.
Eutriana aristidoides Trin. Gram. Unifl. 242. 1824.
Dineba hirsuta Presl, Rel. Haenk. **1**: 292. 1830. (Peru.)
Eutriana hirsuta Kunth, Rév. Gram. **1:** Suppl. XXIII. 1830.

A spreading or erect annual 10 to 20 cm. tall, with numerous narrow spikes about 1 cm. long on an axis as much as 10 cm. long. The sharp-pointed spikes, retrorsely bearded, attach themselves as the fruits in *Aristida*.

Open dry ground, southern United States to Argentina. Originally described from Mexico.

PERU: Without locality, *Haenke*.
BOLIVIA: Gran Chaco, *Fries* 1691.

4. Bouteloua curtipendula (Michx.) Torr. in Emory, Mil. Reconn. 154. 1848.
Chloris curtipendula Michx. Fl. Bor. Amer. **1**: 59. 1803.
Eutriana curtipendula Trin. Fund. Agrost. 161. 1820.

An erect tufted perennial, with culms as much as 1 meter tall, flat blades, and numerous deflexed spikes about 1 cm. long on an axis 10 to 20 cm. long.

Dry plains and hills, Canada to Argentina. Originally described from Illinois.

ECUADOR: Between La Toma and Loja, *Hitchcock* 21399.
PERU: Ambo, *Macbride* 3170. Calacato, *Jelski* 589.
BOLIVIA: Sorata, *Mandon* 1380 (Kew Herb.). Bolivian Plateau, *Bang* 998. Cochabamba, *Hitchcock* 22809; *Holway* 393; *Herzog* 2072. Padcaya, *Fiebrig* 3281 (Kew Herb.), 3282.

5. Bouteloua disticha (H. B. K.) Benth. Journ. Linn. Soc. Bot. **19**: 105. 1881.
Polyodon distichum H. B. K. Nov. Gen. & Sp. **1**: 175. *pl. 55*. 1816.
Eutriana mucronata Areschoug, Svensk. Freg. Eugenies Resa 118. 1910; Repert. Nov. Sp. Fedde **10**: 300. 1912. (Island of Puna, *Andersson* in 1852.)
Bouteloua piurensis Pilger, Repert. Nov. Sp. Fedde **17**: 447. 1921. (*Weberbauer* 5961.)

A spreading annual, with slender decumbent culms 20 to 60 cm. long, flat blades more or less pilose on the margins and upper surface, and 5 to 20 finally spreading or deflexed spikes about 1 cm. long (excluding awns); spikelets mostly 3 to 6, the awns about as long as the spikelets.

Open ground and dry hills, West Indies to northern Peru. Originally described from the mountains of Ecuador, the exact locality not given. (*Bonpland.*)

ECUADOR: Chanduy, *Spruce* 6443.
PERU: Prov. Piura, *Weberbauer* 5961.

6. Bouteloua pilosa (Hook. f.) Benth.; S. Wats. Proc. Amer. Acad. **18**: 179. 1883.

Eutriana pilosa Hook. f. Trans. Linn. Soc. **20**: 173. 1851.

Resembling *B. disticha;* differing in the more numerous and smaller spikes with shorter awns.

Open ground and dry hills, Central America to northern Peru. Originally described from the Galápagos Islands.

ECUADOR: Guayaquil, *Hitchcock* 19943; *Mille* 20; *Jameson* 367 (Kew Herb.). Huigra, *Hitchcock* 20629.

PERU: Tarapoto, *Spruce* 4445.

This species is probably a form of *B. disticha.* The Galápagos specimens agree in having smaller, usually nearly awnless spikelets. The continental specimens cited above have small spikelets, but the awns are somewhat more prominent than in those from the Galápagos Islands. The specimens from Panama to Yucatan are intermediate in size of spikelets and length of awns between the form from the Galápagos and the true *B. disticha* as represented by *Spruce* 6443. The West Indian specimens, having larger spikelets and longer awns, are referred to *B. disticha.*

74. MUNROA Torr.

Spikelets in pairs or threes on a short rachis, the lower one or two larger, 3 or 4-flowered, the upper 2 or 3-flowered, the group (reduced spikes) inclosed in the broad sheaths of short leaves, usually about 3 in a fascicle, forming a cluster or head at the ends of the branches; rachilla disarticulating above the glumes and between the florets; glumes of the lower 1 or 2 spikelets equal, 1-nerved, narrow, acute, a little shorter than the lemmas, those of the upper spikelet unequal, the first much shorter or obsolete; lemmas 3-nerved, those of the lower spikelet coriaceous, acuminate, the points spreading, the mid nerve extended into a mucro, those of the upper spikelet membranaceous; palea narrow, 2-nerved, inclosing the oval, dorsally compressed caryopsis.

Lemmas 3 to 4 mm. long ..... 1. M. argentina.
Lemmas 2 mm. long ..... 2. M. decumbens.

1. Munroa argentina Griseb. Abh. Ges. Wiss. Göttingen **24**: 300. 1879.

A low spreading branching annual, with fascicled leaves, the blades short, flat, sharp-pointed, the rigid spikelets few-flowered, in little glomerules among these fascicles; lemmas 3 to 4 mm. long; caryopsis 2.5 mm. long.

Dry plains and hills, Bolivia and Argentina. Originally described from Argentina.

BOLIVIA: Atocha, *Asplund* 6485.

2. Munroa decumbens R. A. Phil. Anal. Mus. Nac. Chile Bot. **8**: 90. 1891.

Resembling *M. argentina,* spikelets several-flowered, rather soft; lemma 2 mm. long; caryopsis 1.5 mm. long.

Dry plains, Bolivia to Argentina and Chile. Originally described from Tarapacá, Chile.

BOLIVIA: Chiguana, *Asplund* 6504. Uyuni, *Asplund* 6487.

75. TORRESIA Ruiz & Pav.

Spikelets with one terminal perfect floret and 2 staminate florets, all about the same length and about as long as the broad equal papery glumes; sterile lemmas usually awned.

1. Torresia redolens (Forst.) Roem. & Schult. Syst. Veg. **2**: 516. 1817.

Holcus redolens Forst. Fl. Ins. Austr. Prodr. 92. 1786, name only; Vahl, Symb. Bot. **2**: 102. 1791.

An erect perennial from a creeping rhizome, with smooth sheaths and blades and a rather compact, nodding, bronze-brown panicle about 10 cm. long. The plant gives off a vanilla scent.

Damp woods and meadows in antarctic regions, extending north to Ecuador. Originally described from Terra del Fuego.

ECUADOR: Wooded hills, 8 kilometers south of Tulcán. *Hitchcock* 21019.

76. ANTHOXANTHUM L.

Glumes very unequal; sterile lemmas awned, exceeding the small awnless perfect floret.

1. **Anthoxanthum odoratum** L. Sp. Pl. 28. 1753. SWEET VERNAL GRASS.

A tufted fragrant perennial, with flat blades and loosely spikelike panicles commonly about 5 cm. long.

A native of Europe, whence originally described, occasionally cultivated in South America and escaped from cultivation.

ECUADOR: Quito, *Harteman* 9, 80; *Mille* 323.

77. PHALARIS L.

Spikelets strongly compressed, the keeled glumes exceeding the subindurate perfect floret and attached sterile lemmas.

Glumes not winged or scarcely so; panicles 8 to 10 cm. long_____1. **P. angusta.**
Glumes broadly winged; panicles mostly less than 5 cm. long.
  Sterile lemmas in pairs; fertile lemma 5 to 6 mm. long____2. **P. canariensis.**
  Sterile lemmas solitary; fertile lemma 3 mm. long_____3. **P. minor.**

1. **Phalaris angusta** Nees; Trin. Gram. Icon **1**: *pl.* 78. 1827.

A rather stout annual 50 to 100 cm. tall, with flat blades and dense panicles mostly 8 to 10 cm. long.

A weed in fields and waste places, southern United States to Argentina; originally described from Brazil.

BOLIVIA: Sorata, *Mandon* 1246 (Kew Herb.).

2. **Phalaris canariensis** L. Sp. Pl. 54. 1753. CANARY GRASS.

An erect annual, with flat blades and ovoid heads, the papery imbricate spikelets whitish with green stripes.

Widely distributed as a weed of waste places; originally described from Europe.

BOLIVIA: La Paz, *Buchtien* 239. Coroico, *Buchtien* 3641.

3. **Phalaris minor** Retz. Obs. Bot. **3**: 8. 1783.

Resembling *P. canariensis*, but the heads oblong, narrower, about 3 to 4 cm. long and 1 cm. thick, the florets 5 mm. long, less prominently crested.

Sparingly found in waste places along the Pacific coast of North and South America, originally described from the Old World, no locality cited.

PERU: Lima, *Hitchcock* 22346.

78. ORYZA L. RICE

Spikelets perfect, paniculate, laterally compressed; glumes minute; lemma and palea subindurate, papillose-roughened, the lemma awned (the awn sometimes obsolete).

1. **Oryza latifolia** Desv. Journ. de Bot. Desv. **1**: 77. 1813.

Oryza sativa var. *latifolia* Doell in Mart. Fl. Bras. **2**^{2}: 7. 1871.

A rather robust perennial, the simple culms 2 meters tall or more, with thin flat scabrous blades commonly 50 to 60 cm. long and 4 to 5 cm. wide, and large many-flowered panicles, the short-awned spikelets short-pediceled along the upper half to two-thirds of the long slender ascending branches.

Swamps and ditches, Central America and West Indies to Ecuador and Brazil. Type locality given as Carolina and Porto Rico, the first clearly an error.

ECUADOR: Puna Island, *Eggers* 14773. Oil Camp between Guayaquil and Salinas, *Hitchcock* 20050.

79. LEERSIA Swartz

(*Homalocenchrus* Mieg.)

Spikelets awnless, the glumes wanting, otherwise as in *Oryza*, the plants and spikelets much smaller. Under the provisions of the Type-basis Code *Homalocenchrus* is not effectively published.

1. **Leersia hexandra** Swartz, Prodr. Veg. Ind. Occ. 21. 1788.
   Homalocenchrus hexandrus Kuntze, Rev. Gen. Pl. 2: 777. 1891.
   Leersia dubia Areschoug, Svensk. Freg. Eugenies Resa 115. 1910; Repert. Nov. Sp. Fedde 10: 299. 1912. (Guayaquil, *Andersson* in 1852.)

A scabrous subaquatic perennial, the slender culms often 2 meters tall, erect from a creeping base, the flat blades mostly 15 to 20 cm. long and about 8 mm. wide, the many-flowered panicle pale or purplish. Extensively creeping stolons with short blades are sometimes produced in land bordering ponds and ditches.

Swamps and ditches, southern United States to northern Argentina. Originally described from Jamaica.

ECUADOR: Milagro, *Hitchcock* 20252. Guayaquil, *Spruce* 6265 (Kew Herb.).

BOLIVIA: Guanay, *Rusby* 195. Reyes, *Rusby* (*Mulford Biol. Expl.*) 1646. Buena Vista, *Steinbach* 7116.

80. LUZIOLA Juss.

Spikelets unisexual, 1-flowered, disarticulating from the pedicel, the staminate and pistillate flowers in separate panicles on the same plant; first glume and palea wanting; second glume and lemma about equal, thin, several to many-nerved, lanceolate or oblong; stamens several.

1. **Luziola peruviana** Gmel. Syst. Nat. 1: 637. 1791.

A more or less decumbent, spreading, apparently annual grass, with culms 10 to 30 cm. long, flat blades 1 to 2 mm. wide, and spreading panicles 2 to 3 cm. long; pistillate spikelets 2 to 3 mm. long, with striate glume and lemma; fruit globose, smooth, a little more than 1 mm. long; staminate spikelets 5 mm. long.

In water or on mud, Brazil to Peru. Originally described from Peru but no exact locality given, the collector probably Dombey.

PERU: Lima, *Seeman* 866 (Kew Herb.; blades 6 mm. wide).

BOLIVIA: Bermejo, *Fiebrig* 2189.

81. PHARUS L.

Spikelets in pairs, appressed along the slender, spreading, nearly simple panicle branches, one pistillate, subsessile, the other much smaller, staminate, pedicellate; fertile lemma subindurate, terete, clothed, at least toward the beaked apex, with thick uncinate hairs; blades with fine transverse veins between the longitudinal nerves, petioled (the petiole with a single twist reversing the upper and under surfaces of the blade), the nerves running from mid nerve to margin.

Culms creeping at base ..... 3. **P. parvifolius.**

Culms erect or nearly so.
Fruit pubescent only at tip, slightly exceeding the glumes____2. P. latifolius.
Fruit pubescent all over, two to three times as long as the glumes.
1. P. glaber.

1. **Pharus glaber** H. B. K. Nov. Gen. & Sp. 1: 196. 1816.
Pharus glochidiatus Presl, Rel. Haenk. 1: 345. 1830. (Peru.)
An erect glabrous perennial 50 to 75 cm. tall, with flat oblanceolate acuminate blades commonly 15 to 25 cm. long and 3 to 5 cm. wide, and large open fragile panicles, the few branches stiffly ascending or spreading, the appressed oblong brown spikelets about 1 cm. long, the fruit densely clothed with hooked hairs, the panicles readily breaking up, the pieces attaching themselves by the hooked hairs to passing objects.
Rich woods, Mexico and West Indies to Brazil. Originally described from Venezuela.
ECUADOR: Quito Andes, *Jameson* 739 (Kew Herb.).
PERU: San Gavân, *Lechler* 2310 (Kew Herb.). Río Acre,[21] *Ule* 9144 (Kew Herb.).
BOLIVIA: Tres Cruces, *Herzog* 1578. Reyes, *White* 1204.

2. **Pharus latifolius** L. Syst. Nat. ed. 10. 2: 1269. 1759.
Similar to *P. glaber*, the blades on the average broader, the spikelets longer, the summit of the fruit tapering.
Rich woods, West Indies to Brazil and Ecuador. Originally described from Jamaica.
ECUADOR: El Recreo, *Eggers* 15209. Gualaquiza, *Lehmann* 6552 (Kew Herb.). Daule River, *André* 4215 (Kew Herb.).
BOLIVIA: Milluhuaya, *Buchtien* 4173.

3. **Pharus parvifolius** Nash, Bull. Torrey Club 35: 301. 1908.
Creeping at base, the blades on the average smaller and less broadened upward, otherwise like *P. glaber*.
Rich woods, West Indies to Brazil. Originally described from Haiti.
ECUADOR: Without locality, *Eggers* 15188 (Kew Herb.).
BOLIVIA: Covendo, *White* 1043.

MELINIS MINUTIFLORA Beauv. Ess. Agrost. 54 *pl. 11. f. 4.* 1812. MOLASSES GRASS. This Brazilian species is spreading through the countries of South America and will probably be found within our area. It is a straggling branching perennial, with velvety-pubescent, more or less viscid foliage, and narrow, rather dense, purple panicles 10 to 20 cm. long, the spikelets about 2 mm. long; first glume very short; second glume and sterile lemma about as long as the fertile lemma; sterile lemma bearing a slender flexuous awn about 1 cm. long from a notched apex. The plant has a heavy odor when fresh. Molasses grass is cultivated for forage in Brazil and is being tried for this purpose in other parts of tropical America. It was originally described from Brazil but probably was introduced from Africa at an early date. Kuntze[22] describes a variety *inodora* from Bolivia ("Tiefland Velasco") which I have not seen. It is said to be less pilose and to lack the glandular hairs of the ordinary form.

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[21] The label is marked Peru but the region is in disputed territory.
[22] Rev. Gen. Pl. 3²: 356. 1898.

82. **ARUNDINELLA** Raddi

Spikelets short-pedicellate, in large panicles; glumes acuminate, the tips widely spreading, the second longer than the first and the sterile lemma; fertile lemma minute, bearded on the callus, bearing a slender awn from the apex.

Awn tightly twisted below, the part below the bend shorter than the second glume ..... 1. **A. confinis.**

Awn not tightly twisted below, the part below the bend exceeding the glume. ..... 2. **A. berteroniana.**

1. **Arundinella confinis** (Schult.) Hitchc. & Chase, Contr. U. S. Nat. Herb. **18:** 290. 1917.

Piptatherum confine Schult. Mant. **2:** 184. 1824.

Arundinella martinicensis Trin. Gram. Pan. 62. 1826.

A tufted erect perennial, with strong slender simple culms up to 2.5 meters tall, flat blades, scabrous at least on the upper surface, and rather densely flowered, oblong panicles 20 to 40 cm. long.

Grassy slopes, West Indies and southern Mexico to Paraguay. Originally described from Martinique.

ECUADOR: Between La Chorita and Portovelo, *Hitchcock* 21157. Between Portovelo and El Tambo, *Hitchcock* 21284. Huigra, *Rose* 22208.

2. **Arundinella berteroniana** (Schult.) Hitchc. & Chase, Contr. U. S. Nat. Herb. **18:** 290. 1917.

Trichochloa berteroniana Schult. Mant. **2:** 209. 1824.

Thysanachne peruviana Presl, Rel. Haenk. **1:** 253. 1830. (Mountains of Huánuco, Peru, *Haenke.*)

Arundinella crinita Trin. Linnaea **10:** 299. 1836. (Peru, *Pöppig.*)

Arundinella peruviana Steud. Syn. Pl. Glum. **1:** 115. 1854.

Arundinella convoluta Pilger, Bot. Jahrb. Engler **27:** 25. 1899.

Smaller than *A. confinis*, mostly less than 1 meter tall, with narrower, folded or involute blades and more open fewer-flowered panicles with slightly larger spikelets.

Moist places and rocky cliffs, Mexico and West Indies to Brazil and Bolivia. Originally described from Santo Domingo.

ECUADOR: Tocachi, *Sodiro* in 1882. Cashurco, *Hitchcock* 21771, 22103. Chota River, *André* 3390 (Kew Herb.). Napo River, *Jameson* 735 (Kew Herb.).

PERU: Colonia Perené, *Hitchcock* 22063. La Merced, *Macbride* 5357. Tarapoto, *Ule* 6513 (Kew Herb.); *Spruce* 4856. Pangoa, *Mathews* 1080 (Kew Herb.). San Gavân, *Lechler* 2427 (Kew Herb.).

BOLIVIA: Bopi River, *Rusby* 328. Mapiri, *Buchtien* 1175. Rurrenabaque, *Cárdenus* (*Mulford Biol. Expl.*) 1166. Covendo, *White* 995. Without locality. *Rusby* (*Mulford Biol. Expl.*) 2142.

83. **TRICHOPTERYX** Nees

Spikelets 2-flowered, short-pediceled, in rather dense panicles, the first floret staminate, awnless, glabrous, the second pistillate or perfect, awned, pilose.

1. **Trichopteryx flammida** (Trin.) Benth. Journ. Linn. Soc. Bot. **19:** 59. 1882; Ind. Kew. **4:** 1109. 1895.

Arundinella flammida Trin. Gram. Icon. **3:** *pl. 267.* 1831.

A robust perennial 1.5 to 2 meters tall, with long flat blades, and a narrow many-flowered bronze-yellow panicle 30 to 60 cm. long.

Grassy plains and rocky slopes, Brazil, whence originally described, to Bolivia and Paraguay.

BOLIVIA: Buena Vista, *Steinbach* 5358, 6958.

84. TRISTACHYA Nees

Spikelets 2-flowered, sessile in clusters of 3 at the ends of the slender flexuous branches of a nearly simple panicle; lower floret staminate, awnless; fertile lemma with a geniculate twisted awn from between 2 slender teeth.

1. **Tristachya chrysothrix** Nees, Agrost. Bras. 460. 1829.

A tufted, more or less hispidulous perennial a meter or more tall, with narrow, flat or loosely involute blades, and loose few-flowered panicles of large spikelets, the glumes strongly papillose-hispid with spreading golden hairs, the awns 4 to 6 cm. long.

Open grassy slopes, Brazil to Paraguay and Bolivia. Originally described from Brazil.

BOLIVIA: Tres Cruces, *Herzog* 1558.

TRISTACHYA MICROSTACHYA Nees; Steud. Syn. Pl. Glum. 1: 238. 1854. Concerning the origin of the specimen Steudel says, "Lindley hrbr. Lima." The description does not apply to any species known from Peru. Doctor Pilger informs me that the specimen of this at Berlin is a fragment of the inflorescence only and appears to be a species of *Trichopteryx*, probably from Africa and not from South America.

85. LEPTOCORYPHIUM Nees

Spikelets in narrow panicles; first glume wanting; sterile lemma empty, this and the second glume hairy; fertile lemma and palea brown with a white hyaline, somewhat lacerate or ciliate summit, open at maturity.

1. **Leptocoryphium lanatum** (H. B. K.) Nees, Agrost. Bras. 84. 1829.

Paspalum lanatum H. B. K. Nov. Gen. & Sp. 1: 94. *pl. 29*. 1816.
Anthaenantia lanata Benth. Journ. Linn. Soc. Bot. 19: 39. 1881.

A slender erect unbranched tufted perennial up to 1 meter tall, with long, narrow, often involute blades, and loose many-flowered grayish oblong panicles with capillary branchlets and silky-pilose spikelets, the hairs at first appressed, at maturity spreading.

Dry hills and pine barrens, southern Mexico and the West Indies to Argentina. Originally described from Mexico.

PERU: Tarapoto, *Spruce* 4501 (Kew Herb.).

BOLIVIA: Reyes, *Rusby* (*Mulford Biol. Expl.*) 1657. Hacienda Casana, *Buchtien* 7146. Buena Vista, *Steinbach* 6639, 6640.

86. TRICHACHNE Nees
(*Valota* Adans.[33])

Spikelets in pairs, short-pedicellate in 2 rows along one side of a narrow rachis, the slender racemes aggregate in a narrow or flabellate panicle; spikelets lanceolate, clothed with long silky hairs; first glume minute; fruit acuminate, brown with broad white hyaline margins.

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[33] Under the provisions of the Type-basis Code *Valota* is not effectively published. The earliest effectively published name, *Acicarpa* Raddi, is a homonym.

Panicle tawny, sheaths hirsute_____1. T. insularis.
Panicle whitish or purplish.
Spikelets villous but not obscured. Sheaths glabrous____2. T. sacchariflora.
Spikelets hidden by the dense wool_____3. T. saccharata.

1. Trichachne insularis (L.) Nees, Agrost. Bras. 86. 1829.

Andropogon insularis L. Syst. Nat. ed. 10. **2**: 1304. 1759.
Panicum leucophaeum H. B. K. Nov. Gen. & Sp. **1**: 97. 1816.
Valota insularis Chase, Proc. Biol. Soc. Washington **19**: 188. 1906.

A rather coarse, tufted, weedy perennial, with sparsely hirsute sheaths, flat, usually scabrous blades, and silky panicles tawny at maturity.

Open ground and waste places in the tropics and subtropics of America at low altitudes. Originally described from Jamaica.

ECUADOR: Between Otavalo and Malchinguí, *Hitchcock* 20831.

2. Trichachne sacchariflora (Raddi) Nees, Agrost. Bras. 87. 1829.

Acicarpa sacchariflora Raddi, Agrost. Bras. 31. *pl. 1 f. 4.* 1823.
Panicum javanianum Steud.; Lechl. Berb. Amer. Austr. 56. 1857, name only. (*Lechler* 2399); Doell in Mart. Fl. Bras. **2**[2]: 137. 1877.

Resembling *T. insularis;* sheaths glabrous, inflorescence looser; greenish or whitish at maturity, not tawny; racemes loosely flowered; spikelets less silky.

Dry open ground, Brazil, whence originally described, to Peru and Argentina.

PERU: Colonia Perené, *Hitchcock* 22079. La Merced, *Macbride* 5451. San Gaván, *Lechler* 2399 (Kew Herb.).

BOLIVIA: Mapiri, *Rusby* 246. Coroico, *Buchtien* 6443. Chulumani, *Hitchcock* 22665. Buena Vista, *Steinbach* 5221, 6638, 6676.

3. Trichachne saccharata (Buckl.) Nash in Small, Fl. Southeast. U. S. 83. 1903.

Panicum saccharatum Buckl. Prel. Rep. Geol. Agr. Surv. Tex. App. 2. 1866.
Panicum friesii Hack.; R. E. Fries, Nov. Act. Soc. Sci. Upsal. IV. 1[1]: 170. 1905.
Valota saccharata Chase, Proc. Biol. Soc. Washington **19**: 188. 1906.

An erect perennial from knotty swollen felty-pubescent bases, with glabrous culms 50 to 100 cm. tall, flat blades usually rather short, sometimes 10 to 20 cm. long, and narrow, white or purplish panicles 10 to 15 cm. long, with very silky spikelets.

Dry open ground, southwestern United States to Argentina. Originally described from Texas.

BOLIVIA: Cochabamba, *Holway* 321, 368; *Herzog* 2069.

87. SYNTHERISMA Walt. CRABGRASS

Spikelets in two's or three's, short-pedicellate in two rows along one side of a narrow rachis, the slender racemes digitate or subdigitate; spikelets lanceolate or elliptic; first glume minute or obsolete; fruit acute, the lemma with narrow hyaline margins.

Plants annual.
Culms erect to spreading, not creeping. Spikelets elliptic, obtusish; fruit brown_____3. S. violascens.
Culms widely creeping.
Racemes very slender; rachis with scattered long white hairs; spikelets about 2.5 mm. long_____2. S. digitata.
Racemes stouter; rachis without long hairs; spikelets 3 mm. long.
1. S. sanguinalis.

Plants perennial.
Spikelets silky-villous.....4. S. aequatoriensis.
Spikelets glabrous or inconspicuously pubescent.
Second glume obtuse, shorter than the brown fruit.....5. S. leiantha.
Second glume acute, longer than the pale fruit.....6. S. cuyabensis.

1. Syntherisma sanguinalis (L.) Dulac, Fl. Haut. Pyr. 77. 1867. CRABGRASS.
Panicum sanguinale L. Sp. Pl. 57. 1753.
Digitaria sanguinalis Scop. Fl. Carn. ed. 2. 1: 52. 1772.
Panicum adscendens H. B. K. Nov. Gen. & Sp. 1: 97. 1816.
Digitaria marginata Link, Enum. Pl. 1: 102. 1821.
Digitaria fimbriata Link, Hort. Berol. 1: 226. 1827.

A decumbent branching creeping weedy annual, with pilose sheaths and glabrous or pilose, flat blades, and mostly 3 to 8 slender racemes up to 10 cm. long, subdigitate or in fascicles along a short axis, the rachis of the raceme 0.5 mm. broad.

A common weed in cultivated soil and waste places throughout the temperate and tropical regions of both hemispheres. Originally described from America and southern Europe. Probably introduced in the New World.

ECUADOR: Oil Camp between Guayaquil and Salinas, *Hitchcock* 20065. Without locality, *Jameson* 343 (Kew Herb.).

PERU: Colonia Perené, *Hitchcock* 22075, 22082.

BOLIVIA: Bopi River, *Rusby* (*Mulford Biol. Expl.*) 675. Milluhuaya, *Buchtien* 6440. Mapiri, *Rusby* (*Mulford Biol. Expl.*) 245. Coroico, *Buchtien* 443 (Kew Herb.), 3634. Yungas, *Bang* 264 (Kew Herb.). Cochabamba, *Hitchcock* 22839. San Felipe, *Hitchcock* 22606. Hacienda Simaco, *Buchtien* 5318. Hacienda Casana, *Buchtien* 7126. Sirupaya, *Buchtien* 418, Espíritu Santo, *Buchtien* 6439. Buena Vista, *Steinbach* 7057. Río Sirutú, *Steinbach* 6839.

2. Syntherisma digitata (Swartz) Hitchc. Contr. U. S. Nat. Herb. **12**: 142. 1908.
Milium digitatum Swartz, Prodr. Veg. Ind. Occ. 24. 1788.
Digitaria horizontalis Willd. Enum. Pl. 92. 1809.
Digitaria setigera Roth; Roem. & Schult. Syst. Veg. **2**: 474. 1817.
Digitaria setosa Desv.; Hamilt. Prodr. Pl. Ind. Occ. 6. 1825.

Differing from *S. sanguinalis* in the more slender recemes, narrower rachis, more pubescent blades, smaller spikelets, and the presence of scattered long hairs on the rachis.

A common weed in fields, open ground, and waste places, tropical regions of both hemispheres. Originally described from Jamaica.

ECUADOR: Milagro, *Hitchcock* 20272. Balao, *Jameson*, 385 (Kew Herb.).

BOLIVIA: Buena Vista, *Steinbach* 6989.

3. Syntherisma violascens (Link) Nash in Brown, Proc. Acad. Phila. **61**: 488. 1909.
Digitaria violascens Link, Hort. Berol. 1: 229. 1827.
Panicum violascens Kunth, Rév. Gram. 1: 33. 1829.

A decumbent annual 30 to 80 cm. tall, with glabrous or pubescent sheaths and blades, and few to many slender, ascending and somewhat out-curving racemes 4 to 8 cm. long on an axis 2 to 5 cm. long; rachis with margins much narrower than the center; spikelets 1.3 to 1.5 mm. long, minutely pubescent; first glume obsolete.

Fields and grassy places in the tropics of both hemispheres. Originally described from a garden plant, the seed from Brazil.

PERU: Colonia Perené, *Hitchcock* 22090, 22091, 22092.

BOLIVIA: Coroico, *Buchtien* 644. Coripata, *Hitchcock* 22674. Hacienda Casana, *Buchtien* 7128. Hacienda Simaco, *Buchtien* 5335. Reyes, *White* (*Mulford Biol. Expl.*) 1536 (Kew Herb.).

4. Syntherisma aequatoriensis Hitchc., sp. nov.

Perennial, with a knotty felty-pubescent base or crown; culms slender, erect or decumbent and widely spreading, glabrous, 40 to 60 cm. tall, or finally more than 1 meter; sheaths densely papillose-pilose, the hairs whitish, soft, often reflexed, especially above the nodes; ligule membranaceous, about 2 mm. long, truncate, dentate; blades thin, flat, lanceolate, spreading, 5 to 10 cm. long, as much as 15 mm. wide, acuminate, pubescent on both surfaces or glabrate, often pilose with long hairs at base; panicle of several (as many as 25) slender ascending racemes 3 to 20 cm. long on an axis 1 to 10 cm. long, several at the lower 1 or 2 nodes, and 1 or 2 above, the nodes pubescent, often also with a few spreading hairs as much as 3 mm. long, the rachis of the racemes angular, scabrous; spikelets appressed along the rachis, narrow, 3 mm. long; first glume minute, glabrous, triangular, less than 0.5 mm. long; second glume a little shorter and a little narrower than the sterile lemma, acuminate, 3-nerved, appressed-villous; sterile lemma 7-nerved, glabrous along the middle of the back, silky-villous along the margin and the outer internerves, the hairs sometimes purplish, extending beyond the summit as a short tuft or pencil, finally at maturity all the hairs spreading; fertile lemma brownish, acuminate, about as long as the sterile lemma.

Type in the U. S. National Herbarium, no. 1,164,906, collected among brush, at Guayaquil, Ecuador, June 20, 1923, by A. S. Hitchcock (no. 19949).

Besides the type the following specimens have been seen:

ECUADOR: Guayaquil, *Mille* 17, 18. Oil Camp between Guayaquil and Salinas, *Hitchcock* 20056½. Milagro, *Hitchcock* 20271. Huigra, *Hitchcock* 20609; *Holway* 824.

BRAZIL: West of Garanhuns, Pernambuco, *Chase* 7826.

This species approaches *Trichachne* in the felty-pubescent knotty crown and the elongate axis of the racemes, but the shape and pubescence of the spikelets, the shape of the blades, and the spreading habit of the plant are those of *Syntherisma*. An allied species is *Digitaria doellii* Mez.

5. Syntherisma leiantha (Hack.) Hitchc.

Panicum adustum var. *leianthum* Hack. Repert. Nov. Sp. Fedde **6:** 342. 1909.
Digitaria adusta var. *leiantha* Parodi, Physis **7: 57.** 1923.

An erect glabrous perennial about 1 meter tall, with several erect or ascending, rather stiff racemes 10 to 15 cm. long, scattered along an axis 7 cm. long, the glabrous elliptic spikelets about 2.5 cm. long. Differing from *Syntherisma adusta* (Nees) Chase (*Panicum adustum* Nees) in the glabrous spikelets, paler fruit, and the more numerous and longer recemes, these 15 to 20 cm. long.

Meadows and open slopes, southern Brazil and Bolivia to Paraguay and northern Argentina. Originally described from Paraguay.

BOLIVIA: Samaipata, *Herzog* 1763.

6. Syntherisma cuyabensis (Trin.) Hitchc. Contr. U. S. Nat. Herb. **22:** 468. 1922.

Panicum cuyabense Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. **1:** 206. 1834.

A spreading perennial, with culms as much as 1 meter long, mostly pubescent, flat blades, several slender ascending racemes about 10 cm. long, and narrowly lanceolate, acuminate spikelets about 2.5 mm. long; first glume obsolete; second glume and sterile lemma somewhat longer than the fertile lemma, somewhat pubescent on the nerves.

Sandy soil, British Guiana to Argentina. Originally described from Brazil.

BOLIVIA: Buena Vista, *Steinbach* 6877.

PASPALUM PUBESCENS Presl, Rel. Haenk. 1: 214. 1830. This is said to come from Peru, but in the errata (p. 351) the locality is changed to Monterey, Calif. It is a species of *Syntherisma* (*S. pubescens* (Presl) Scribn.; *Paspalum preslii* Kunth). The species has not been identified and the locality is uncertain.

88. THRASYA H. B. K.

Inflorescence a single terminal spikelike raceme, the rachis with membranaceous wings, partially embracing the row of spikelets; spikelets apparently subsessile and solitary in a single row, but actually in pairs, the spikelets of each pair back to back, the pedicel of the primary spikelet adnate to the mid nerve of the rachis; first glume minute, often hyaline; second glume shorter than the spikelet; sterile lemma subindurate, thinner down the middle, at maturity splitting to the base, the margins of the split rolling inward, the sterile palea nearly as long as its lemma, the margins firm, inclosing a staminate flower or empty; fruit cartilaginous-indurate, commonly with stiff hairs at the summit.

1. **Thrasya campylostachya** (Hack.) Chase, Proc. Biol. Soc. Washington **24**: 115. 1911.

Panicum campylostachyum Hack. Oesterr. Bot. Zeitschr. **51**: 367. 1901.

An erect cespitose perennial, with flat linear pubescent blades and terminal and axillary racemes 4 to 9 cm. long; spikelets glabrous or nearly so, crowded in a single row, the base partly embraced by the margins of the rachis.

Grassy banks, Guatemala to Bolivia. Originally described from Costa Rica.

BOLIVIA: Coripata, *Hitchcock* 22694. Coroico, *Hitchcock* 22728. San José, *Hitchcock* 22733. Milluhuaya, *Buchtien* 4265.

In the National Herbarium is a fragment (from the Munich Herbarium) of *Thrasya petrosa* (Trin.) Chase, collected in Peru by Haenke. In the absence of other specimens confirming the locality, this species, known only from Brazil and Paraguay, is omitted from the list.

89. PSEUDECHINOLAENA Stapf

Spikelets loosely arranged in several erect or ascending racemes, the back of the fruit of the primary spikelet turned from the axis; first and second glumes about as long as the spikelet, the second uncinate-spiny and ventricose at maturity.

1. **Pseudechinolaena polystachya** (H. B. K.) Stapf in Prain, Fl. Trop. Afr. **9**: 495. 1919.

Echinolaena polystachya H. B. K. Nov. Gen. & Sp. **1**: 119. 1816.

Panicum uncinatum Raddi, Agrost. Bras. 41. 1823.

Plants creeping and rooting at base, the fertile culms erect or ascending, 20 to 40 cm. tall; blades thin, ovate-lanceolate, 3 to 6 cm. long; racemes 2 to 3 cm. long.

Moist shady soil, southern Mexico to Bolivia and Uruguay. Originally described from Colombia.

ECUADOR: Nieblí, *Sodiro* 315. El Recreo, *Eggers* 15147. Cashurco, *Hitchcock* 21853. Cerro Manglar Alto, *Tate* 19. Tandapí, *Holmgren* 859.

PERU: Colonia Perené, *Hitchcock* 22068. La Merced, *Macbride* 5354. Casapí, *Mathews* 2103 (Kew Herb.). Chachapoyas, *Mathews* 3241 (Kew Herb.).

BOLIVIA: Mapiri, *Buchtien* 1166, 1170; *Rusby* 229. Guanay, *Rusby* 218. Yungas, *Bang* 364. Hacienda Simaco, *Buchtien* 5320. Coroico, *Buchtien* 265, 6437. Milluhuaya, *Buchtien* 4273. La Florida, *Hitchcock* 22629. Unduavi, *Rusby* in 1885. Espíritu Santo, *Buchtien* 6468. Tres Cruces, *Herzog* 1594.

90. MESOSETUM Steud.

Inflorescence a single erect terminal spikelike raceme, the spikelets subsessile, solitary, in two rows on one side of a slender rachis, the back of the fruit turned from the rachis, ventricose on the side toward the rachis and fitting into its concavities, the back of the spikelet flat or nearly so; glumes and sterile lemma usually bearing stiff hairs on the strong lateral nerves, the mid nerve of the sterile lemma faint or suppressed; sterile palea wanting; fruit ventricose on the palea side.

1. **Mesosetum rottboellioides** (H. B. K.) Hitchc. Contr. U. S. Nat. Herb. 12: 211. 1909.

Panicum rottboellioides H. B. K. Nov. Gen. & Sp. 1: 96. *pl. 32*. 1816.

A slender erect perennial 40 to 60 cm. tall, the culms simple, the narrow firm spreading blades mostly 10 to 15 cm. long, the yellowish raceme 5 to 10 cm. long.

Moist places, Colombia to Brazil and Bolivia. Originally described from the Orinoco River.

BOLIVIA: Ixiamas, *White* 2318.

91. ERIOCHLOA H. B. K.

Inflorescence of few to many racemes racemose on a common axis; spikelets subsessile, solitary or paired, the back of the fruit turned from the slender rachis; internode of the rachilla between the first and second glumes thickened, forming a ringlike base to the spikelet, the first glume usually reduced to an obscure sheath adnate to the ring; fruit minutely papillose-rugose, mucronate-pointed or with a delicate, often deciduous awn.

Racemes 2, rarely 3 ..... 1. E. distachya.
Racemes several (3 or 4 in *E. pacifica*).
  Racemes 1 to 2 cm. long, dense, rather distant; pedicels with erect hairs, nearly as long as the spikelets ..... 3. E. weberbaueri.
  Racemes mostly more than 2 cm. long, slender, approximate; pedicels subglabrous or with short hairs.
    Spikelets villous, narrowed into a subulate glabrous point; racemes few ..... 2. E. pacifica.
    Spikelets more or less pubescent but scarcely villous, acute to acuminate but not subulate-pointed; racemes several.
      Spikelets 3 mm. long; plants annual.
        Fruit short-awned; pedicels glabrous or nearly so ..... 4. E. ramosa.
        Fruit obtuse, awnless; pedicels conspicuously villous ..... 5. E. peruviana.
      Spikelets 4 to 6 mm. long; plants perennial except in *E. eggersii*.
        Nodes villous; first glume evident ..... 7. E. polystachya.
        Nodes puberulent; first glume obsolete.
          Fruit awned, the awn nearly equaling the sterile lemma. 6. E. punctata.
          Fruit cuspidate, the point less than 1 mm. long ..... 8. E. eggersii.

1. **Eriochloa distachya** H. B. K. Nov. Gen. & Sp. 1: 95. *pl. 30*. 1816.

An erect perennial 20 to 40 cm. tall, branched above, the slender exserted peduncles bearing 2 (rarely 3) racemes 1 to 2 cm. long, about 1 cm. apart, the rachis woolly, the short pedicels with a ring of long hairs at the summit.

Growing in moist places, Guatemala to Paraguay. Originally described from Venezuela.

PERU: Tarapoto, *Spruce* 4368 (Kew Herb.).

BOLIVIA: Reyes, *White* 1521. Guanay, *Rusby* 214, 215.

2. Eriochloa pacifica Mez, Bot. Jahrb. Engler **56**: Beibl. **125**: 11. 1921.

Resembling *E. distachya* but stouter, the blades shorter and broader, the racemes mostly 3 or 4, sometimes more, wider, the spikelets long-acuminate and subulate-pointed, silky-villous below, glabrous above.

Dry ground, coast of Ecuador. (Type, *Eggers* 14772.)

ECUADOR: Guayaquil, *Mille* 9. Puna Island, *Eggers* 14772. Chanduy, *Spruce* 6446, 6447. Also in the Galápagos Islands.

3. Eriochloa weberbaueri Mez, Bot. Jahrb. Engler **56**: Beibl. **125**: 11. 1921.

Densely tufted, with long prostrate culms and ascending branches, very leafy below, the short thick racemes mostly spreading, the pedicels bearing stiff hairs nearly as long as the pubescent paired spikelets.

Open dry ground. Known only from the type collection.

PERU: Santa Cruz, *Weberbauer* 4135.

4. Eriochloa ramosa (Retz.) Kuntze, Rev. Gen. Pl. **2**: 775. 1891.

Milium ramosum Retz. Obs. Bot. **6**: 22. 1791.

Eriochloa annulata Kunth, Rév. Gram. **1**: 30. 1829.

A slender ascending glabrous annual with sparingly branching culms, linear blades 2 to 5 mm. wide, and pale panicles of few to several erect or ascending racemes; spikelets silky.

Ditches and wet places in the Old World tropics. Originally described from India. Introduced in a few localities in tropical America.

PERU: Lima, *Hitchcock* 22339. Callao, *Wilkes Expl. Exped.* (Kew Herb.).

5. Eriochloa peruviana Mez, Bot. Jahrb. Engler **56**: Beibl. **125**: 12. 1921.

A spreading geniculate annual, differing from *E. ramosa* in the obtuse awnless fruit; spikelets 3 mm. long; pedicels long-villous.

Known only from the type specimen, collected between Piura and the Hacienda Nomala, Peru, *Weberbauer* 5952, in the Berlin Herbarium.

6. Eriochloa punctata (L.) Desv.; Hamilt. Prodr. Pl. Ind. Occ. 5. 1825.

Milium punctatum L. Syst. Nat. ed. 10. **2**: 872. 1759.

Eriochloa montevidensis Griseb. Abh. Ges. Wiss. Göttingen **24**: 306. 1879.

A glabrous branching perennial, ascending from a decumbent base, commonly 1 meter or more tall, with flat blades 10 to 15 mm. wide, and several to many narrowly ascending racemes.

Moist places, southern United States to Argentina. Originally described from Jamaica.

ECUADOR: Milagro, *Hitchcock* 20256, 20559.

PERU: Lima, *Didrichsen.* Chosica, *Macbride & Featherstone* 546.

BOLIVIA: Covendo, *White* 914. Coroico, *Buchtien* 6432. Chulumani, *Hitchcock* 22666. Bopi River, *Rusby* (*Mulford Biol. Expl.*) 674.

7. Eriochloa polystachya H. B. K. Nov. Gen. & Sp. **1**: 95. *pl. 31.* 1816.

CARIB GRASS.

Monachne subglabra Nash, Bull. Torrey Club **30**: 374. 1903.

Eriochloa subglabra Hitchc. Contr. U. S. Nat. Herb. **12**: 208. 1909.

Similar to *E. punctata*, more decumbent or stoloniferous in favorable situations, the nodes densely villous; racemes looser, the spikelets in pairs, the first glume developed as a minute broad loose membrane.

Lowland along the coast, West Indies to Brazil and Ecuador. Originally described from Guayaquil, Ecuador. (*Bonpland.*)

ECUADOR: Guayaquil, *Hitchcock* 19915. Panigón Plantation, *Hitchcock* 20562.

8. Eriochloa eggersii Hitchc., sp. nov.

Culms rather stout, erect from a decumbent base, glabrous, about 1 meter tall, the nodes puberulent; sheaths glabrous except the puberulent collar; ligule a short dense fringe of hairs; blades flat, rather lax, glabrous on both surfaces or scaberulous beneath, the margins scabrous, slightly cordate at base, 15 to 25 cm. long, as much as 2 cm. wide; panicle about 10 cm. long, of several ascending or appressed racemes about 2 cm. long, the culm below the panicle and the axis densely pubescent; rachis of the racemes and the pedicels densely short-villous, the pedicels with a tuft of several long hairs at the summit; spikelets 5 to 6 mm. long; second glume sparingly appressed-hispid on the lower half or two-thirds, glabrous above, acuminate; sterile lemma similar to the glume, somewhat shorter; fruit oblong-oval, 2.5 mm. long, abruptly cuspidate, the awn less than 1 mm. long.

Type in the U. S. National Herbarium, no. 822110, collected at El Recreo, Province of Manibí, Ecuador, by Eggers (no. 15423).

This collection is cited by Mez under his original description of *E. pacifica*. I have chosen *Eggers* 14772 as the type of that species, since it is the first specimen cited and the other cited specimens that I have examined are like it rather than like no. 15423. The description is too meager to follow in the selection of the type. The type of *E. eggersii* is the only specimen of this species seen. In this the base of one culm is present but not the base of the entire plant. It appears to be annual.

92. BRACHIARIA (Trin.) Griseb.

Inflorescence of few to several rather thick racemes; spikelets solitary, subsessile, the back of the fruit turned from the rachis; first glume well developed.

1. Brachiaria plantaginea (Link) Hitchc. Contr. U. S. Nat. Herb. **12**: 212. 1909.

Panicum plantagineum Link, Hort. Berol. 1: 206. 1827.

An erect or often widely spreading, glabrous, branching annual, with flat blades as much as 15 mm. wide, and mostly 3 or 4 spreading racemes 3 to 7 cm. long, remote along the axis, the glabrous spikelets 4 to 4.5 mm. long.

Moist places, often a weed in cultivated ground, southern United States to Brazil, whence originally described, and Bolivia.

BOLIVIA: Coripata, *Hitchcock* 22673. Coroico, *Buchtien* 3636. Milluhuaya, *Buchtien* 4197. Without locality, *Bang* 2588.

93. AXONOPUS Beauv.

Inflorescence of 2 to many slender racemes, aggregate at the summit of the culm; spikelets depressed-biconvex, oblong-elliptic, solitary, subsessile, the back of the fruit turned from the rachis; first glume wanting; sterile palea obsolete.

Rachis bearing conspicuous stiff spreading golden yellow hairs.
- Spikelets partially sunken in the broad rachis_____2. A. chrysoblepharis.
- Spikelets not sunken in the slender rachis.
  - Spikelets glabrous or nearly so_____1. A. aureus.
  - Spikelets pilose_____3. A. herzogii.

Rachis not bearing stiff hairs.
- Plants annual, the delicate racemes 2 or 3_____4. A. capillaris.
- Plants perennial.
  - Blades flat, mostly more than 5 mm. wide (less in *A. fissifolius*).
    - Racemes on the main culms few; plants mostly less than 1 m. tall.
      - Plants stoloniferous or creeping; racemes green.

Blades of stolons short, broad, obtuse; glume and sterile lemma pointed beyond the fruit ..... 5. A. compressus.
Blades all alike; glume and sterile lemma not pointed beyond the fruit ..... 6. A. fissifolius.
Plants not stoloniferous; racemes purplish-brown ..... 7. A. mathewsii.
Racemes on the main culm numerous; plants robust, usually more than 1 m. tall, sometimes stoloniferous ..... 8. A. scoparius.
Blades folded or involute not more than 5 mm. wide, usually stiff. Bunch grasses.
Racemes numerous.
Spikelets nearly 3 mm. long, strongly nerved ..... 9. A. barbigerus.
Spikelets 1.5 to 2 mm. long, obscurely nerved ..... 13. A. attenuatus.
Racemes few to several.
Spikelets with conspicuous stiff purple hairs ..... 12. A. marginatus.
Spikelets glabrous or with inconspicuous pubescence.
Blades involute, fine; pedicels glabrous ..... 10. A. siccus.
Blades folded, firm; pedicels with a few long, straight hairs below the spikelets ..... 11. A. elegantulus.

1. Axonopus aureus Beauv. Ess. Agrost. 12. 1812.

Paspalum aureum H. B. K. Nov. Gen. & Sp. 1: 93. 1816.

A tall slender branching perennial, with wiry compressed culms, rather firm, spreading, flat blades, and a handsome inflorescence of 4 to 15 subdigitate slender golden-brown racemes, the stiff orange-yellow hairs in tufts below the spikelets as well as along the margins.

The name *Paspalum aurem* H. B. K. is based on *Axonopus aureus* Beauv., but the plant described and figured (*pl. 27*) under the name is *Axonopus chrysoblepharis* (Lag.) Chase.

Wet sandy savannas, Porto Rico and Colombia to Brazil and Bolivia. Type locality not indicated in the original description.

BOLIVIA: Hacienda Casana, *Buchtien* 7142. Ixiamas, *White* 1131. Buena Vista, *Steinbach* 5426, 6948.

2. Axonopus chrysoblepharis (Lag.) Chase, Proc. Biol. Soc. Washington **24**: 134. 1911.

Cabrera chrysoblepharis Lag. Gen. & Sp. Nov. 5. 1816.

Resembling *A. aureus* but the nodes pubescent, and the racemes stiffer, with a rachis 1 to 1.5 mm. wide, extending beyond the sunken spikelets.

Dry grassy slopes, Venezuela to Bolivia and Paraguay. Originally described from Panama and the port of Arica. We have seen no specimens from Peru or Chile.

BOLIVIA: Reyes, *Rusby* 216. Hacienda Anacuri, *Holway* 708. Chulumani, *Hitchcock* 22703.

3. Axonopus herzogii (Hack.) Hitchc.

Paspalum herzogii Hack. in Herzog, Repert. Nov. Sp. Fedde **7**: 50. 1909.

An erect perennial 30 to 40 cm. tall, with firm folded blades somewhat flabellately aggregate at the base, papillose-ciliate toward base, and 5 or 6 fascicled racemes 6 to 8 cm. long, the rachis papillose-hispid, the pilose spikelets 2.5 mm. long.

High plains, eastern Bolivia. Originally described from Santiago de Chiquitos. Known only from the type collection.

BOLIVIA: Santiago, *Herzog* in 1905.

4. Axonopus capillaris (Lam.) Chase, Proc. Biol. Soc. Washington **24**: 133. 1911.

Paspalum capillare Lam. Tabl. Encycl. **1**: 176. 1791.

Paspalum minutum Trin. Linnaea **10**: 293. 1836. (Cuchero, Peru, *Pöppig*.)

A slender, ascending, branching, nearly glabrous annual, with thin blades 2.5 to 5 cm. long and about 4 mm. wide, long subcapillary peduncles, and 2 or 3 delicate racemes about 2.5 cm. long.

Moist open ground, Central America to Peru and Brazil. Originally described from tropical America.

ECUADOR: Portovelo, *Hitchcock* 21254.

PERU: Colonia Perené, *Hitchcock* 22111. La Merced, *Macbride* 5609. Without locality, *Pöppig* 829; *Lechler* 2284.

BOLIVIA: Chulumani, *Hitchcock* 22657. Milluhuaya, *Buchtien* 4275. Hacienda Simaco, *Buchtien* 5327. Mapiri, *Buchtien* 1160; *Rusby* 241. Cochabamba, *Bang* 872. Buena Vista, *Steinbach* 6879.

5. Axonopus compressus (Swartz) Beauv. Ess. Agrost. 12. 1812. CARPET GRASS.

Milium compressum Swartz, Prodr. Veg. Ind. Occ. 24. 1788.

Paspalum platicaulon Poir. in Lam. Encycl. Suppl. **5**: 34. 1804.

Paspalum compressum Raspail, Ann. Sci. Nat. **5**: 301. 1825.

Paspalum macropodium Steud. Syn. Pl. Glum. **1**: 19. 1854. (*Jameson* 556.)

A nearly glabrous perennial, under favorable conditions producing long leafy stolons with short broad obtuse blades, the flowering culms erect or ascending, compressed, with rather thin blades 8 to 10 mm. wide, and 2 to 5 slender racemes along a short axis, 2 or 3 secondary peduncles often produced from the upper node.

Moist grassland, southern United States to Argentina; also in the warmer parts of the Old World. Originally described from Jamaica.

ECUADOR: Milagro, *Hitchcock* 20174, 20233. Quito, *Harteman* 66. Pomasqui, *Sodiro* in 1897. El Recreo, *Eggers* 15836. Baños, *Hitchcock* 21908. Balao, *Eggers* 14658. Between La Chorita and Portovelo, *Hitchcock* 21181. Between La Toma and Loja, *Hitchcock* 21421. Guayaquil, *Jameson* 556 (Kew Herb.). Andes of Ecuador, *Spruce* 5941 (Kew Herb.).

PERU: Colonia Perené, *Hitchcock* 22062, 22088.

BOLIVIA: Chulumani, *Hitchcock* 22671. Buena Vista, *Steinbach* 5159, 6990 (blades pubescent). Espíritu Santo, *Buchtien* 2505. Hacienda Simaco, *Buchtien* 5328.

6. Axonopus fissifolius (Raddi) Kuhlm. Comm. Linhas Telegr. Matto Grosso **67**: 87. 1922.

Paspalum fissifolium Raddi, Agrost. Bras. 26. 1823.

Differing from *A. compressus* in its much more slender and decumbent habit, in the nearly conform foliage of stolons and fertile culms, and in the smaller, less pubescent spikelets, the glume and sterile lemma not pointed beyond the fruit.

Open ground, Colombia to Bolivia. Originally described from Brazil.

BOLIVIA: Coroico, *Hitchcock* 22716; *Buchtien* 267, 6434. Milluhuaya, *Buchtien* 4276. Chulumani, *Hitchcock* 22654. La Florida, *Hitchcock* 22625. Yanacachi, *Buchtien* 419. Hacienda Simaco, *Buchtien* 5326. Buena Vista, *Steinbach* 6724, 6847.

7. Axonopus mathewsii (Mez) Hitchc.

Paspalum mathewsii Mez, Repert. Nov. Sp. Fedde **15**: 62. 1917.

An erect glabrous perennial 40 to 100 cm. tall, with flat blades as much as 1 cm. wide, and 2 to 8 slender lax spreading racemes 5 to 10 cm. long.

Open slopes, Ecuador and Peru. Originally described from Peru. (Type, *Mathews* 3239.)

ECUADOR: Between Loja and San Lucas, *Hitchcock* 21465, 21483.

PERU: Chachapoyas, *Mathews* 3239 (Kew Herb.).

8. Axonopus scoparius (Flügge) Hitchc. Contr. U. S. Nat. Herb. **22**: 471. 1922.

Paspalus scoparius Flügge, Monogr. Pasp. 124. 1810.

Paspalum iridifolium Poepp. Reise **2**: 324. 1836. (Peru, *Pöppig.*)

Paspalum hackelianum Sodiro, Anal. Univ. Quito **1889**: 4. 1889?

Paspalum tripinnatum Mez, Repert. Nov. Sp. Fedde **15**: 64. 1917. (*Buchtien* 410 [err. 1410.])

A stout smooth erect perennial as much as 2 meters tall, with long stout stolons, blades as much as 3 cm. wide, and large panicles as much as 30 cm. long. The panicles are terminal and axillary and vary much in size. In vigorous specimens the panicle is compound, the lower branches bearing racemes, the total number of racemes sometimes being as many as 100. On small plants the racemes may be only 10.

Cultivated for forage; called "gamalote," "cachi," and "caricachi."

Moist ground, Colombia to Brazil. Originally described from Venezuela.

ECUADOR: Teresita (cultivated), *Hitchcock* 20470, 20521. Panigón Plantation, *Hitchcock* 20555, 20598. Río Toache, *Sodiro.* Río Pilatón (*Paspalum hackelianum*), *Mille* 302. Río Verde, *Pachano* 236. Baños, *Sodiro.* Cashurco, *Hitchcock* 21752, 21807, 21810, 21826. Portovelo, *Hitchcock* 21267. Between La Chorita and Portovelo, *Hitchcock* 21193. Between El Tambo and La Toma, *Hitchcock* 21336. Napo River, *Jameson* 762 (Kew Herb.). Bucay, *Rose* 22436.

PERU: Colonia Perené, *Hitchcock* 22080, 22086. La Merced, *Hitchcock* 22157. San Miguel, *Cook & Gilbert* 902. Huacachi, *Macbride* 3863. Yanano, *Macbride* 3761. Muña, *Macbride* 4052.

BOLIVIA: Coroico, *Buchtien* 3628. Yanacachi, *Buchtien* 410. La Florida, *Hitchcock* 22608; *Holway* 666. Chulumani, *Hitchcock* 22662, 22700. Hacienda Simaco, *Buchtien* 5324, 5328.

9. Axonopus barbigerus (Kunth) Hitchc.

Paspalum barbatum Nees; Trin. Gram. Icon. 1: *pl. 98.* 1828. Not *P. barbatum* Schult. 1827.

Paspalum barbigerum Kunth, Rév. Gram. 1: 24. 1829.

Axonopus barbatus Chase; Parodi, Rev. Facult. Agron. Vet. **4**: 49. 1922.

A robust perennial more than 1 meter tall, with numerous pale slender ascending racemes 10 to 20 cm. long.

Grassy plains, Brazil and Bolivia to Uruguay, whence originally described, and Paraguay.

BOLIVIA: Hacienda Casana, *Buchtien* 7130. Buena Vista, *Steinbach* 5377, 6976.

10. Axonopus siccus (Nees) Kuhlm. Comm. Linhas Telegr. Matto Grosso **67**: 87. 1922.

Paspalum siccum Nees, Agrost. Bras. 28. 1829.

A slender erect perennial 0.5 to 1.5 meters tall, with firm narrow elongate involute blades, and few to several erect racemes 5 to 10 cm. long.

Grassy plains, Brazil, whence originally described, to Bolivia and Paraguay.

BOLIVIA: Samaipata, *Herzog* 1709.

11. Axonopus elegantulus (Presl) Hitchc.

Paspalum elegantulum Presl, Rel. Haenk. 1: 211. 1830.

Paspalum gregoriense Mez, Bot. Jahrb. Engler **56**: Beibl. **125**: 10. 1921. (*Weberbauer* 6570.)

An erect or decumbent perennial, with strongly keeled sheaths, hispidulous collar, narrow folded blades, and few to several erect racemes 4 to 6 cm. long. The plants grow in large bunches, the leafless base of the culms often long and slender like a stolon.

Rocky hillsides; known only from Peru. Originally described from the mountains of Huánuco. (*Haenke.*)

PERU: Ollantaytambo, *Hitchcock* 22515. Mito, *Macbride & Featherstone* 1498; *Macbride* 3270, 3324. Yanano, *Macbride* 3760. San Gregorio, *Weberbauer* 6570.

12. Axonopus marginatus (Trin.) Chase, Contr. U. S. Nat. Herb. 17: 228. 1913.

Paspalum marginatum Trin. Gram. Pan. 90. 1826.

A slender glabrous closely cespitose perennial 30 to 60 cm. tall from a somewhat swollen base, with erect narrow blades 2 to 3 mm. wide, and few to several ascending racemes 3 to 6 cm. long.

Grassy plains, Brazil, whence originally described, to Bolivia.

BOLIVIA: Hacienda Casana, *Buchtien* 7118.

13. Axonopus attenuatus (Presl) Hitchc. Contr. U. S. Nat. Herb. 22: 471. 1922.

Paspalum attenuatum Presl, Rel. Haenk. 1: 212. 1830.

An erect perennial 50 to 100 cm. tall, with compressed shoots, overlapping, strongly keeled sheaths, folded blades, numerous slender racemes 7 to 10 cm. long, and obscurely nerved spikelets 1.5 to 2 mm. long.

Sandy savannas, Guiana to Peru and Brazil. In Peru known only from the type collection.

PERU: Huánuco, *Haenke.*

94. PASPALUM L.[34]

Inflorescence of 1 to many racemes, these racemes along a common axis; spikelets plano-convex (in a few species unequally biconvex, or concavo-convex), subsessile along a slender or winged rachis, the back of the fruit turned toward it; first glume typically wanting, developed in a few species; fertile lemma and palea chartaceous-indurate (thin in *P. saccharoides*).

Rachis winged (wing suppressed in nos. 16 to 19, with silky spikelets). Fruit pale. (Subgenus CERESIA.)

Spikelets glabrous.

Racemes not falling from the main axis. Spikelets more than 3 mm. long. **13. P. crassum.**

Racemes falling entire from the main axis (tardily in *P. candidum;* spikelets less than 3 mm. long. Rachis green, foliaceous.

Plants perennial, aquatic ---------- **1. P. repens.**

Plants annual, terrestrial.

Second glume developed.

Rachis extending beyond the uppermost spikelet; second glume and sterile lemma not loose.

Plants in low dense mats. Foliage pilose ------- **4. P. pygmaeum.**

Plants not in mats.

Spikelets 2 to 2.2 mm. long, greenish; axis 2 to 2.5 mm. wide. **5. P. prostratum.**

Spikelets not more than 1.8 mm. long, whitish; axis less than 2 mm. wide.

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[34] Contributed by Agnes Chase.

Spikelets distinctly hollowed on the flat side with raised margin; culms decumbent and branching__2. **P. penicillatum.**
Spikelets not hollowed; culms erect, simple__3. **P. tuberosum.**
Rachis with a spikelet at its apex; second glume and sterile lemma loose.
Second glume and sterile lemma not much larger than the fruit; rachis about 2 mm. broad_____6. **P. sodiroanum.**
Second glume and sterile lemma much larger than the fruit; rachis scarcely more than 1 mm. wide, or less.
Spikelets 2 mm. long, the glume and sterile lemma not fluted. **7. P. flavum.**
Spikelets 2.5 mm. long, the sterile lemma distinctly fluted, the glume slightly so_____8. **P. racemosum.**
Second as well as first glume suppressed.
Plants very scabrous, elongate and clambering_____12. **P. scabrum.**
Plants not or very slightly scabrous.
Culms commonly 1 meter or more long; spikelets 2.3 to 2.5 mm. long_____9. **P. candidum.**
Culms commonly not more than 50 cm. long; spikelets not over 2 mm. long.
Culms vinous-purple or purple-tinged; sheaths glabrous or nearly so_____10. **P. depauperatum.**
Culms pale stramineous; sheaths pilose_____11. **P. lineispatha.**
Spikelets silky. Rachis brightly colored, membranaceous; spikelets clothed with long silky hairs; perennials.
Rachis more than 5 mm. wide; spikelets solitary.
Blades 5 to 8 mm. wide_____14. **P. ceresia.**
Blades not more than 3 mm. wide_____15. **P. stellatum.**
Rachis 1 mm. or less wide; spikelets or some of them paired.
Spikelets pale; glume and sterile lemma 5-nerved, both long-ciliate; blades less than 5 mm. wide_____19. **P. polyphyllum.**
Spikelets purplish to tawny; glume and sterile lemma 3-nerved, only the glume long-ciliate; blades commonly more than 10 mm. wide.
Racemes spreading or drooping, more than 5 cm. long; spikelets with a conspicuous fringe of long silky hairs.
Blades stiffly pilose, at least on the margins; racemes mostly 2 to 5, spreading_____16. **P. humboldtianum.**
Blades glabrous or nearly so; racemes mostly 8 to 16, drooping. **17. P. buchtienii.**
Racemes narrowly ascending, less than 5 cm. long; spikelets with a soft inconspicuous fringe_____18. **P. soboliferum.**
Rachis not winged, or if narrowly winged not foliaceous nor broad and membranaceous with silky spikelets.
Fertile lemma strongly ridged; spikelets concavo-convex. Both glumes suppressed. (Subgenus ANACHYRIS.)
Blades velvety beneath; rachis sparsely pilose; spikelets 1.7 to 2 mm. long (mostly less than 2 mm.)_____53. **P. malacophyllum.**
Blades glabrous; rachis glabrous; spikelets 2 to 2.2 mm. long. **54. P. boliviense.**
Fertile lemma not ridged, spikelets generally plano-convex; second glume normally developed.
Fruit scarcely indurate, pointed; spikelets with long silky white hairs on the margin. (Subgenus MOENCHIA)_____55. **P. saccharoides.**

Fruit mostly strongly indurate, if relatively thin, spikelets not long-silky (Subgenus OPISTHEON.)
Racemes 2, conjugate, or approximately so, at the summit of the culm, rarely a third below. Spikelets solitary.
Plants annual, tufted, not stoloniferous.
Spikelets orbicular, bearing globular hairs_____32. P. multicaule.
Spikelets obovate, glabrous_____32A. P. pictum.
Plants perennial, stoloniferous or creeping.
Spikelets elliptic or narrowly ovate, not silky around the margin.
Second glume and sterile lemma glabrous_____20. P. vaginatum.
Second glume pubescent_____21. P. distichum.
Spikelets suborbicular or nearly as broad as long.
Spikelets sparsely silky around the margin, about 1.5 mm. long.
38. P. conjugatum.
Spikelets glabrous, 2.5 to 3 mm. long_____39. P. notatum.
Racemes 1 to many, racemose or fasciculate, not conjugate.
Inflorescence a large flabellate panicle of numerous racemes; spikelets solitary _____50. P. fasciculatum.
Inflorescence not flabellate, or if slightly so, spikelets in pairs.
Racemes solitary (rarely 2 in no. 52) ; spikelets in pairs.
Spikelets densely white-woolly_____52. P. ekmanianum.
Spikelets glabrous. First glume developed on at least one of each pair of spikelets.
Plants creeping; spikelets 1.5 mm. long_____26. P. decumbens.
Plants not creeping; spikelets about 2.5 mm. long_51. P. pilosum.
Racemes 2 to many (or solitary in axillary inflorescences).
Spikelets suborbicular or broadly ovate, not more than 2 mm. long; fruit pale.
Spikelets pubescent with short crisp hairs, in pairs. Culms erect or suberect.
Spikelets not more than 1.7 mm. long, brownish.
Sterile lemma pubescent; spikelets rounded at apex, 1.2 to 1.4 mm. long_____29. P. paniculatum.
Sterile lemma glabrous; spikelets slightly abruptly acutish, 1.6 to 1.7 mm. long_____30. P. juergensii.
Spikelets 2 mm. long, yellowish_____31. P. tenellum.
Spikelets glabrous.
Plants creeping; spikelets solitary.
Spikelets about 1 mm. long_____36. P. orbiculatum.
Spikelets about 1.8 mm. long_____37. P. haenkeanum.
Plants erect, robust; spikelets in pairs.
Rachis scarcely pilose; spikelets 2 to 2.2 mm. long.
45. P. millegrana.
Rachis densely pilose; spikelets 1.8 to 2 mm. long.
46. P. densum.
Spikelets elliptic to ovate or obovate, if approaching suborbicular the fruit dark brown.
Fruit pale.
Spikelets 1.2 mm. long_____33. P. gossipinum.
Spikelets 2 mm. or more long.
Glume and sterile lemma loose, more or less rumpled, glabrous; spikelets solitary. Rachis 1 to 2 mm. wide.

Rachis finely pubescent, especially on the inside; blades densely grayish-villous_____23. P. bonplandianum.
Rachis glabrous or obscurely puberulent; blades puberulent.
Spikelets 2.1 to 2.3 mm. long; rachis 1.5 mm. wide.
24. P. pilgerianum.
Spikelets 2.5 to 3 mm. long; rachis 2.5 to 3 mm. wide.
25. P. pallidum.
Glume and sterile lemma not loose and rumpled; spikelets paired.
Rachis with very narrow margins, 0.8 to 2 mm. wide.
Plants glabrous; rachis flat; inflorescence terminal only.
Spikelets abruptly and minutely pointed.
22. P. lividum.
Plants with more or less puberulent to velvety foliage; rachis with upturned margins; inflorescence terminal and axillary.
Culms 45 to 85 cm. tall; blades puberulent to glabrescent _____27. P. inconstans.
Culms 20 to 45 cm. tall; blades densely velvety-pubescent on both surfaces_____28. P. lepidum.
Rachis not at all winged.
Spikelets on relatively long pedicels, loosely arranged in splender racemes in open pyramidal panicles.
Plants annual; second glume and sterile lemma equal, covering the fruit_____34. P. microstachyum.
Plants perennial; second glume about half as long as the fruit and sterile lemma__35. P. inaequivalve.
Spikelets subsessile, imbricate.
Spikelets pubescent. Racemes few to several; blades flat.
Blades mostly not more than 1 cm. wide, scarcely wider than the sheath at base; spikelets more than 3 mm. long_____49. P. remotum.
Blades 1 to 2.5 cm. wide, broadly rounded and wider than the sheath at base; spikelets not more than 3 mm. long.
Racemes spreading, rather distant; spikelets 2.5 mm. long_____47. P. macrophyllum.
Racemes ascending, approximate; spikelets 2.8 to 3 mm. long_____48. P. barclayi.
Spikelets glabrous.
Rachis scarcely pilose; spikelets 2 to 2.2 mm. long.
45. P. millegrana.
Rachis densely pilose; spikelets 1.8 to 2 mm. long.
46. P. densum.
Fruit brown.
Spikelets 3 mm. long; fruit not shining; plants robust, commonly 2 meters tall_____44. P. virgatum.
Spikelets 2 to 2.5 mm. long, strongly plano-convex; fruit dark and shining; plants rarely more than 1 meter tall.
Plants annual; spikelets 2 mm. long.
40. P. melanospermum.

Plants perennial; spikelets about 2.5 mm. long.
Sterile lemma finely undulate inside the slightly raised margin, glabrous----------41. P. plicatulum.
Sterile lemma not or very obscurely undulate, appressed pubescent.
Blades densely pubescent beneath, long-pilose above.
42. P. pubifolium.
Blades ciliate and with long hairs at the very base, otherwise glabrous----------43. P. collinum.

1. **Paspalum repens** Berg. Act. Helv. Phys. Math. **7**: 129. *pl.* 7. 1772.
Ceresia fluitans Ell. Bot. S. C. & Ga. **1**: 109. 1816.
Paspalum fluitans Kunth, Rév. Gram. **1**: 24. 1829.

An aquatic or subaquatic perennial, with submerged stems and floating branches buoyed up by the inflated sheaths, thin flat blades, and panicles of numerous spreading racemes, the small flat elliptic whitish spikelets in 2 rows on the broad green rachis.

In sluggish streams or standing water, southeastern United States to Ecuador and Paraguay. Originally described from Dutch Guiana.

ECUADOR: Balao, *Eggers* 14632; *Jameson* 540.

2. **Paspalum penicillatum** Hook. f. Trans. Linn. Soc. **20**: 171. 1851.

A decumbent branching annual, with ascending flowering culms 15 to 40 cm. long, flat lax blades mostly 3 to 10 cm. long and 6 to 12 mm. wide, and panicles of several to many spreading racemes 10 to 20 mm. long, commonly in pairs, the whitish spikelets about 1.7 mm. long.

Shaded places on moist slopes and in cultivated ground, Ecuador, Peru, and Bolivia. Described from Charles Island, Galápagos.

ECUADOR: Quito, *Holway* 909. Cotocollao, *Mille* 303, 303½. Ambato, *Pachano* 15. Riobamba, *Mille* 58. Huigra, *Rose* 24016. "Andes," *Spruce* 5943.

PERU: Cutervo, *Jelski* 407. Tambillo, *Jelski* 582.

BOLIVIA: Sorata, *Rusby* 240; *Bang* 1310; *Holway* 507½. Sirupaya, *Buchtien* 417. Villa Aspiazu, *Holway* 697. La Florida, *Hitchcock* 22612, 22643.

Part of Mille's no. 303 (which we have numbered 303½) has sparsely pilose foliage, and Holway's no. 507½ rather copiously pilose foliage.

3. **Paspalum tuberosum** Mez, Repert. Nov. Sp. Fedde **15**: 29. 1917.

An erect perennial (?), branching at the base, the slender culms 12 to 28 cm. tall, leafy toward the base, the foliage pilose to glabrescent, the blades 4 to 5 mm. long and about 3 mm. wide, the panicle 3 to 4 cm. long, with 4 to 9 ascending to spreading racemes, the pale spikelets about 1.7 mm. long.

Probably in moist or muddy places.

Known only from *Weberbauer* 3815 from San Pablo, and *Weberbauer* 3932 from San Miguel, Dept. Cajamarca, Peru, both numbers being cited with the original description. Both collections were examined in the herbarium of the Berlin Botanical Museum. The species is described as perennial, but the bases of the plants are matted with dried mud and vegetation, with nothing tuberous evident. All the allied species are annuals and it seems probable that this also is annual.

4. **Paspalum pygmaeum** Hack. Repert. Nov. Sp. Fedde **11**: 18. 1912.
Paspalum minimum Meyen, Reis. Erd. **1**: 484. 1834, name only. (Maravillas, *Meyen;* dwarf plants.)
Paspalum haenkeanum var. *minimum* Nees, Act. Acad. Caes. Leop. Carol. **19**: Suppl. **1**: 6. 1841; 138. 1843.
Paspalum pygmaeum var. *glabrescens* Hack. Repert. Nov. Sp. Fedde **11**: 18. 1912. (*Buchtien* 2490.)

A low annual, branching at the base and forming mats, with spreading culms 2 to 10 cm. long, the ends ascending from strongly geniculate nodes, pilose foliage, the blades rarely more than 3 cm. long, and small panicles of 3 to 6 racemes, mostly less than 12 mm. long, commonly equaled or exceeded by the uppermost blades; spikelets 1.7 to 1.9 mm. long.

Open ground on high plateaus, Peru and Bolivia. (Type, *Buchtien* 859.)

PERU: La Quinhua, *Macbride & Featherstone* 2030. Río Blanco, *Macbride & Featherstone* 804. Pucará, *Weberbauer* 415. Maravillas, *Meyen.* Tambillo, *Jelski* 582. Southern Peru, *Weddell* 4423, 4490.

BOLIVIA: La Paz, *Buchtien* 859, 2490. Pongo, *Hitchcock* 22772. Talca Chugiaguillo, *Bang* 808.

In Macbride & Featherstone's no. 2030 the spikelets are 2 mm. long.

5. Paspalum prostratum Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. **24:** 9. 1900.

Resembles both *P. penicillatum,* than which it is stouter and larger-leaved, and *P. candidum;* from the latter it is distinguished by the greenish spikelets with the second glume developed.

Moist slopes at middle and higher altitudes, southern Mexico to Bolivia. Originally described from Mexico.

BOLIVIA: Sorata, *Holway* 507.

6. Paspalum sodiroanum Hack. Oesterr. Bot. Zeitschr. **51: 237. 1901.**

Paspalum peruvianum Mez, Repert. Nov. Sp. Fedde **15: 28. 1917.** (*Weberbauer* 137.)

A decumbent branching annual, with culms commonly 1 meter or more long, flat lax blades 7 to 18 cm. long and 7 to 12 mm. wide, and oblong panicles of numerous approximate ascending racemes 1 to 4 cm. long, the spikelets 2 mm. long, the sterile lemma loose and rumpled, the terminal spikelet purple.

Moist shaded places, at middle altitudes, Colombia to Peru. Originally described from Ecuador, the type collected by Father Sodiro in 1886 at 2,000 meters, locality not given.

ECUADOR: Nieblí, *Sodiro* in 1882. Without locality, *Sodiro* in 1886.

PERU: Between Tambo de Viso and Chaupichaca, *Weberbauer* 137.

7. Paspalum flavum Presl, Rel. Haenk. **1:** 220. 1830.

Paspalum cristatum Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. **1:** 152. 1834.

Paspalum mollendense Mez, Repert. Nov. Sp. Fedde **15:** 31. 1917. (*Weberbauer* 1553; an exceptionally robust specimen with panicles 15 to 18 cm. long.)

A glabrous annual, branching at the base, with culms 20 to 55 cm. long, loose sheaths and thin flat blades mostly 5 to 10 cm. long and 5 to 10 mm. wide, and oblong panicles 5 to 18 cm. long and 1.5 to 2 cm. wide, of numerous approximate arching racemes 8 to 20 mm. long, the spikelets about 2 mm. long, stramineous to dark purple, the glumes and sterile lemma larger than the fruit, thin and loose, the rachis scarcely 1 mm. wide, commonly appearing narrower because of the inrolled margins.

Probably in moist places (no habitat is given with any of our specimens), on the Pacific slope, Peru and Chile. Originally described from unknown locality.

PERU: Obrajillo, *Wilkes Expl. Exped.* Lima, *Dombey.* Matucana, *Macbride & Featherstone* 135. Mollendo, *Weberbauer* 1553. Without locality, *Heyne; Pavón.*

8. Paspalum racemosum Lam. Tabl. Encycl. **1:** 176. 1791.

Paspalum stoloniferum Bosc, Trans. Linn. Soc. **2:** 83. *pl. 16.* 1794. (Peru.)

Milium latifolium Cav. Icon. Pl. **3:** 37. *pl. 273.* 1794. (Peru.)

Paspalum purpureum Ruiz & Pav. Fl. Peruv. Chil. 1: 47. 1798. (Peru.)
Paspalianthum stoloniferum Desv. Opusc. 59. 1831.
Maizilla stolonifera Schlecht. Bot. Zeit. 8: 605. 1850.
Paspalum biglume Steud. Syn. Pl. Glum. 1: 24. 1854.
Paspalum manabiense Mez, Repert. Nov. Sp. Fedde 15: 30. 1917. (*Eggers* 14965, a small specimen with pale spikelets.)

A glabrous annual, with sparingly branching culms decumbent and rooting at the lower nodes, commonly 60 to 100 cm. long, loose sheaths, thin flat blades usually 3 to 12 cm. long and 1 to 2.5 cm. wide, rounded to subcordate at base, and oblong panicles 5 to 15 cm. long and 1.5 to 3 cm. wide, of numerous approximate, ascending to spreading racemes 1 to 2.5 cm. long, the rachis about 1 mm. wide, the spikelets about 2.5 mm. long, commonly purple to rusty brown, but sometimes pale, the glume and sterile lemma much longer than the fruit, thin, loose and finely fluted.

In recently disturbed soils, fields, waste places, and roadsides, spreading or clambering among brush, Colombia to Peru. Originally described from Peru.

ECUADOR: El Recreo, *Eggers* 14965. Perucho, *Sodiro* without number. Huigra, *Holway* 823; *Hitchcock* 20341; *Rose* 22162, 24017, 24022, 24025. Huataxi, *Spruce* 5959 (Kew Herb.). Guayaquil, *Anthony & Tate* 79; *Hitchcock* 19955, 20132, 20134.

PERU: Lima, *Hitchcock* 22338; *Wilkes Expl. Exped.; Cuming* 1054; *Mathews* 425, 426 (last three numbers in Kew Herb.). Santa Clara, *Rose* 18742. "Callao et Lima," *Didrichson* 4387.

9. Paspalum candidum (Humb. & Bonpl.) Kunth, Mém. Mus. Hist. Nat. 2: 68. 1815.

Reimaria candida Humb. & Bonpl.; Flügge, Monogr. Pasp. 214. 1810.
Paspalum candidum Kunth, Mém. Mus. Hist. Nat. 2: 68. 1815.
Paspalum confertum Willd.; Steud. Nom. Bot. ed. 2. 2: 270. 1841.
Paspalum uniseriatum Steud.; Lechl. Berb. Amer. Austr. 55. 1857, name only. (*Lechler* 1862.)

A loosely branching annual, with culms commonly more than 1 meter long, decumbent at base, straggling or clambering in brush, smooth to slightly scabrous sheaths, thin, flat, softly pilose blades 5 to 14 cm. long, and 5 to 12 mm. wide, commonly much smaller on the branches, and loose panicles 5 to 12 cm. long, of 8 to 20 ascending or arched-spreading racemes 2 to 4 cm. long, the rachis 2 to 2.5 mm. wide, the white oblong spikelets 2.3 to 2.5 mm. long, commonly so far apart as to appear to be in a single row, not appressed, but more or less spreading from the rachis.

In moist places and recently disturbed soils, roadsides and along hedges, southern Mexico to Bolivia. Originally described from "Puanbo" [Puembo], Ecuador (*Bonpland*).

ECUADOR: Quito, *Heilborn* 539. Chillo, *Sodiro* 300. Nono, *Sodiro* in 1887. Huigra, *Rose* 22582. Las Juntas, *Rose* 23219. Cumbe, *Rose* 22957.

PERU: Obrajillo, *Wilkes Expl. Exped.* Mito, *Macbride & Featherstone* 1366. Machu Picchu, *Cook & Gilbert* 858. Without locality, *Lechler* 1862; *Heyne*.

BOLIVIA: San Felipe, *Hitchcock* 22597.

10. Paspalum depauperatum Presl, Rel. Haenk. 1: 215. 1830.

Paspalum vinosum Mez, Repert. Sp. Nov. Fedde 15: 28. 1917. (Sirupaya, *Buchtien*. The date and other data of the type specimen agree with those of *Buchtien* 422.)

Resembling *P. candidum*, but the culms shorter, purplish, decumbent with erect branches; nodes densely pubescent; sheaths smooth; blades velvety

beneath and finely papillose-pubescent above, on the average smaller than in *P. candidum;* panicles shorter, purple-tinged; spikelets about 2 mm. long.

In brushy borders, Venezuela and Colombia to Bolivia. Originally described from Huánuco, Peru, the type specimen collected by Haenke.

ECUADOR: Alausí, *Hitchcock* 20723. Portovelo, *Hitchcock* 21206.

PERU: Huánuco (?), *Ruiz* 4620.

BOLIVIA: Sirupaya, *Buchtien* 422.

Hitchcock's no. 20723 has stouter culms and broader blades than the other specimens and rather dense panicles of few to numerous racemes; some of the panicles are conspicuously vinous-purple.

11. **Paspalum lineispatha** Mez, Repert. Nov. Sp. Fedde **15**: 27. 1917.

Resembling *P. candidum*, but much smaller, the weak to delicate, decumbent culms 10 to 30 cm. long; sheaths and blades softly pilose; panicles 1.5 to 3 cm. long, of 2 to 12 spreading racemes 1 to 1.5 cm. long, the rachis about 1.5 mm. wide; spikelets about 1.8 mm. long. Closely related to *P. depauperatum*, differing in the pale weak culms, pilose sheaths, smaller pale panicles, narrower rachis, and smaller spikelets.

Probably in moist shaded places (no habitat given on either specimen seen), at middle and upper altitudes, Peru and Bolivia. Originally described from Peru; type, *Weberbauer* 3142. The locality published is "infra Hacienda Cajabamba, Samanco inter et Casaz, Dept. Ancachs, alt. 3000–3500 M." Doubtless Caraz, Dept. Ancash, is meant; the altitude indicates a locality well up in the Cordillera.

PERU: Caraz, *Weberbauer* 3142.

BOLIVIA: Hacienda Casano, *Buchtien* 7112.

12. **Paspalum scabrum** Scribn. U. S. Dept. Agr. Div. Agrost. Bull. **4**: 36. *pl. 3.* 1897.

A straggling annual, very scabrous throughout, with elongate, divergently branching, sometimes vinous-purple culms, clambering over shrubs, thin flat scabrous-hispid blades 5 to 10 cm. long and 10 to 18 mm. wide, tapering to both ends, and pale panicles 12 to 20 cm. long of numerous subverticillate spreading racemes 1.5 to 5 cm. long, the rachis acuminate, the white spikelets about 1.8 mm. long.

Brushy slopes, Guatemala to Ecuador. Originally described from Guatemala.

ECUADOR: Guayaquil, *Hitchcock* 19948. Milagro, *Hitchcock* 20274.

13. **Paspalum crassum** Chase in Hitchc. Contr. U. S. Nat. Herb. **17**: 239. 1913.

A coarse erect annual 35 to 100 cm. or more tall, branching from the base, with coarsely papillose-hirsute foliage, the flat blades 11 to 25 cm. long and 15 to 25 mm. wide, tapering to a rounded base; panicle of 4 to several pale thick ascending racemes, on a narrowly winged axis, the rachis 3 to 4 mm. wide, tapering to a narrow summit, the margins hispidulous; spikelets solitary (or a few paired about the center of the raceme), crowded, oval, turgid, about 3.5 mm. long, blunt, pale, glabrous, the first glume developed as a minute thick bractlet or obsolete, the second glume and sterile lemma subindurate, equal.

Along ditches and in moist open ground, Mexico and Peru. Originally described from Mexico; the type specimen, from Colima, is much taller than the Peruvian specimen and the blades are as much as 60 cm. long.

PERU: Colonia Perené, *Hitchcock* 22076.

14. **Paspalum ceresia** (Kuntze) Chase in Niles, Contr. U. S. Nat. Herb. **24**: 153. 1925.

Paspalum membranaceum Lam. Tabl. Encycl. **1**: 177. 1791. Not *P. membranaceum* Walt. 1788.

Ceresia elegans Pers. Syn. Pl. 1: 85. 1805.
Ceresia membranacea Beauv. Ess. Agrost. 9, 171. *pl. 5. f. 4.* 1812.
Paspalum elegans Roem. & Schult. Syst. Veg. 2: 290. 1817. Not *P. elegans* Flügge 1810.
Panicum ceresia Kuntze, Rev. Gen. Pl. 3²: 360. 1898.

An erect perennial, densely villous at the base, with culms in tufts from a short rhizome, sometimes one or two culms with a decumbent lower joint rooting at the node with a knoblike cluster of villous scales, glaucous foliage, the flat blades mostly 5 to 15 cm. long and 3 to 8 mm. wide, usually stiffly pilose on the upper surface near the margin, and 1 to 4 ascending to arching racemes rather distant on a very slender axis, the ribbonlike rachis purplish or bronze-green with bright yellow-brown margins and crowded silvery-silky spikelets, the hairs exceeding the spikelets and obscuring them.

Open, rather dry, rocky slopes, at middle altitudes, Ecuador, Peru, and Bolivia. Originally described from Peru.

ECUADOR: Between Loja and San Lucas, *Hitchcock* 21491.

PERU: Mito, *Macbride & Featherstone*, 1780. Without locality, *Ruiz* 4621; *Pavón.*

BOLIVIA: Sorata, *Mandon* 1255 (1755?). Cochabamba, *Hitchcock* 22825. Charagua, *Herzog* 1210. Buena Vista, *Steinbach* 5421. Bolivian plateau, *Bang* 1080.

15. Paspalum stellatum Humb. & Bonpl. in Flügge, Monogr. Pasp. 62. 1810.

A tufted erect perennial with narrow subinvolute hirsute blades and simple wiry culms 25 to 50 cm. tall, the solitary (or rarely paired) arcuate racemes 5 to 10 cm. long, the ribbonlike rachis golden-brown, the glistening white hairs of the spikelets stellately spreading at maturity.

Open dry slopes in the uplands, southern Mexico to Argentina. Originally described from Colombia.

BOLIVIA: Buena Vista, *Steinbach* 7103.

16. Paspalum humboldtianum Flügge, Monogr. Pasp. 67. 1810.
Paspalum ciliatum H. B. K. Nov. Gen. & Sp. 1: 87. *pl. 24.* 1816. Not *P. ciliatum* Lam. 1791.
Paspalum blepharophorum Roem. & Schult. Syst. Veg. 2: 292. 1817.
Panicum humboldtianum Kuntze, Rev. Gen. Pl. 3²: 361. 1898.

A tufted perennial, with culms commonly 50 to 80 cm. tall, erect from a woody decumbent base, usually branching from the lower nodes, leafy toward the base with overlapping sheaths and spreading blades, the sheaths and blades papillose-pilose, the firm flat sharp-pointed blades 8 to 18 cm. long and 8 to 15 mm. wide; racemes 2 to 5, ascending or spreading, lax, 5 to 10 cm. long, the rachis dull purple, the crowded purplish spikelets glistening with long white silky hairs, but hardly obscured by them.

Stony open or brushy slopes in the highlands from Mexico to Argentina. Originally described from Puembo, Ecuador (*Bonpland*).

ECUADOR: Quito, *Harteman* 65. Ambato, *Hitchcock* 21710. Huigra, *Rose* 22639. Between Huigra and Naranjapata, *Hitchcock* 20656. Portovelo, *Rose* 24027; *Hitchcock* 21306.

PERU: Chosica, *Holway* 782; *Macbride & Featherstone* 517. Ollantaytambo, *Hitchcock* 22485.

BOLIVIA: Sorata, *Rusby* 205. Cotaña, *Buchtien* 3125. Illimani, *Julio* 44. Cochabamba, *Hitchcock* 22795, 22830. Buena Vista, *Steinbach* 6644. Río Cuchi, *Steinbach* 6618. Without locality, *Bang* 2590.

17. Paspalum buchtienii Hack. Repert. Nov. Sp. Fedde 6: 153. 1908.

Resembling *P. humboldtianum*, but on the average taller and somewhat straggling, with larger blades not crowded at base and mostly glabrous on

the upper surface, and commonly with 8 to 16 longer drooping racemes (rarely only 4 or 5), the rachis narrower and the silky hairs on the spikelets less dense.

Open or brushy, stony or gravelly slopes at middle altitudes, in the Yungas region, Bolivia, whence originally described; type, *Buchtien* 420.

BOLIVIA: Unduavi, *Rusby* 24. Coroico, *Buchtien* 444 (Kew Herb.), 3629, 3630. Milluhuaya, *Buchtien* 4274. Hacienda Anacuri, *Holway* 712, 719. La Florida, *Holway* 678. *Hitchcock* 22640, 22648. Sirupaya, *Buchtien* 420. Chulumani, *Hitchcock* 22664. "Yungas," *Bang* 265; *Rusby* 29.

18. Paspalum soboliferum Chase, sp. nov.

Plant perennial, about 60 cm. long, somewhat tinged with dull vinous-purple; culm simple below, pushing through vegetation, then freely branching, the branches subfasciculate, stiffly ascending, about equaling the main culm; culms glabrous, leafy, the sheaths overlapping, keeled, the lower sparsely long-pilose, the upper glabrous or pilose along the margin only; ligule 2 to 2.5 mm. long, membranaceous, erose; blades mostly spreading, firm, flat, 5 to 15 cm. long, 6 to 9 mm. wide (the uppermost much reduced), scarcely narrowed at base, long-acuminate, subinvolute at the apex, long-pilose at base on the upper surface and at least the lower sparsely ciliate, glabrous beneath; panicle short-exserted, of 3 to 7 (mostly 5) narrowly ascending racemes, 2 to 4.5 cm. long, the main axis 2 to 5.5 cm. long, slender, glabrous; rachis 1 mm. wide, with a tuft of long hairs at the base, otherwise glabrous; spikelets mostly in pairs on minute slender glabrous pedicels, crowded, elliptic, subacute, 2.8 to 2.9 mm. long, 1.2 to 1.3 mm. wide, excluding the cilia, dull purple to tawny; glume and sterile lemma equal, thin in texture, 3-nerved, the lateral nerves near the margin, the glume finely pubescent, the margin ciliate with soft spreading hairs about 1 mm. long, the sterile lemma glabrous; fruit pale, elliptic, slightly smaller than the spikelet.

Type in the U. S. National Herbarium, no. 1,164,798, collected along an agave hedge, between Loja and San Lucas, altitude 2,100 meters, September 6, 1923, by A. S. Hitchcock (no. 21495). No other collection has been seen.

Related to *P. humboldtianum;* differing in the more numerous flowering branches, the less hairy foliage, and especially in the shorter, more slender, narrowly ascending racemes, with smaller spikelets bearing an inconspicuous fringe of soft hairs.

19. Paspalum polyphyllum Nees in Trin. Gram. Pan. 114. 1826.

A slender perennial, with suberect culms 20 to 60 cm. long, after flowering commonly producing short sterile branches with numerous small spreading blades, short-jointed below or throughout; sheaths glabrous except at the mouth, the spreading subinvolute blades 2 to 5 cm. long, mostly not more than 3 mm. wide, densely puberulent on both surfaces and with a few long hairs back of the ligule; racemes 1 to 3, mostly nodding, 2 to 7 cm. long, with crowded pale spikelets with a conspicuous silvery-silky fringe.

Open stony slopes at middle altitudes, eastern Bolivia and Brazil, whence originally described. The collections from Bolivia are depauperate plants.

BOLIVIA: Buena Vista, *Steinbach* 5162, 5385, 6808.

20. Paspalum vaginatum Swartz, Prodr. Veg. Ind. Occ. 21. 1788.

Paspalum kleineanum Presl, Rel. Haenk. 1: 209. 1830. (Peru.)

An extensively creeping perennial, with loose sheaths and spreading involute-margined blades 2 to 6 mm. wide, tapering from base to apex, the sterile runners often stout, with closely imbricate leaves, the flowering branches

ascending, commonly 20 to 30 cm. tall, with a pair of divergent racemes (rarely 3), the flat acuminate spikelets usually 3 to 4 mm. long.

Seacoasts and brackish sands, Gulf coast and the West Indies to Argentina and Chile; also in the Old World. Originally described from Jamaica.

ECUADOR: Balao, *Eggers* 14602.

PERU: "Callao and Lima," *Didrichsen* 4384.

21. Paspalum distichum L. Syst. Nat. ed. 10. **2**: 855. 1759.

Panicum paspaliforme Presl, Rel. Haenk. 1: 296. 1830. (Huánuco, Peru, *Haenke.*)

Similar to *P. vaginatum*, the flowering culms commonly taller, the blades slightly wider and softer.

Ditches and wet (sometimes brackish or alkaline) places, southern United States and West Indies to Argentina and Chile; also in the Old World. Original locality not known, probably Jamaica.

ECUADOR: Ibarra, *Sodiro* in 1888. Pomasqui, *Sodiro* in 1897. "Andes," *Spruce* 5921 (Copenhagen Herb.).

PERU: Chosica, *Holway* 781 (sterile).

BOLIVIA: La Paz, *Buchtien* 4518. Cotaña, *Buchtien* 3126. San José, *Hitchcock* 22730. Cochabamba, *Hitchcock* 22793. Arque, *Hitchcock* 22790. Oploca, *Hitchcock* 22882. Tarija, *Fries* 1064. Río Suturú, *Steinbach* 6835.

22. Paspalum lividum Trin. in Schlecht. Linnaea **26**: 383. 1854.

A tufted glabrous perennial; culms compressed, ascending from a decumbent base; blades flat, lax; racemes 3 to 5, subflexuous, approximate on the very slender axis, the rachis rather broad, the glabrous spikelets commonly lurid purplish, the glume and sterile lemma very thin.

Savannas, moist ground, and along ditches, Gulf coast to Peru and Paraguay. Originally described from Mexico.

ECUADOR: La Magdalena, *Harteman* 16.

PERU: Huánuco, *Ruiz* (?). "Canruru, Andes of Peru," *Savatier* in 1876–79 (Kew Herb.).

23. Paspalum bonplandianum Flügge, Monogr. Pasp. 71. 1810.

A tufted perennial, with a thick horizontal rhizome and in favorable situations extensively creeping, stout, leafy stolons, the sheaths and short blades densely grayish-villous; culms simple, ascending to suberect, glabrous, 25 to 60 cm. tall, leafy toward the base, the lower sheaths villous, the upper mostly glabrous, the flat blades 5 to 12 cm. long, 3 to 7 mm. wide, grayish-villous (rarely the foliage nearly glabrous); panicle 6 to 11 cm. long, of 6 to 10 ascending to spreading racemes 1.5 to 5 cm. long, the rachis about 1.5 mm. wide, dark purple, finely pubescent, especially on the inside, the solitary spikelets on minute hairy pedicels, loosely crowded, glabrous, pale to purple-tinged, elliptic, 2.2 to 3 mm. long, the glume and sterile lemma slightly pointed beyond the fruit.

Paramos and high wooded slopes, Ecuador and Peru. In the original description, the specimen collected by Humboldt and Bonpland, is said to be from Peru, but the specimens of this collection in the Berlin and Paris herbaria are labeled "Regnum quitense," (Ecuador). The specimen in the Willdenow Herbarium (which is probably the one described by Flügge) is labeled "Humboldt 3081, Amer. merid." In Hartweg's no. 1447 and Cook & Gilbert's no. 700 the spikelets are only 2 mm. long or slightly longer; the foliage is villous as in typical specimens.

ECUADOR: Tulcán, *Hitchcock* 20989. La Rinconada, *Hitchcock* 20782. Atacatzo, *Holmgren* 597; *Mille* in 1917. Lloa, *Sodiro* 301. Quito, *Hartweg* 1447. Between San Lucas and Oña, *Hitchcock* 21536.

PERU: Ollantaytambo, *Cook & Gilbert* 700.

24. Paspalum pilgerianum Chase.

Paspalum bonplandianum var. *glabrescens* Pilger, Bot. Jahrb. Engler **27**: 17. 1899.

A tufted perennial with slender rhizomes, not stoloniferous (so far as known); culms simple, ascending or spreading, glabrous, 10 to 35 cm. tall, leafy throughout, the lower sheaths and blades puberulent, the upper sparsely puberulent to nearly glabrous, the flat blades 2 to 12 cm. long, 2 to 5 mm. wide; panicle 2.5 to 7 cm. long, of 3 to 10 approximate ascending to spreading racemes 1 to 3 cm. long, the rachis about 1.5 mm. wide, glabrous, the solitary, pale or purplish glabrous spikelets mostly crowded, 2.1 to 2.3 mm. long, about 1.3 mm. wide, oval, the glume and sterile lemma scarcely exceedingly the fruit.

The series of specimens cited below show a difference in habit and a general difference in aspect from *P. bonplandianum*. The plants are not conspicuously villous, as in that species, but they are scarcely glabrescent. Under *Paspalum* the varietal name would be misleading, for which reason the species is renamed in honor of Dr. Robert Pilger.

Wood borders and open slopes at middle altitudes, Ecuador and Peru. The type, *Stübel* 102, was collected "in monte Cusin vel San Pablo Urcu," a locality we are unable to find on the maps.

ECUADOR: San Pablo Urcu, *Stübel* 102. Tulcán, *Hitchcock* 20967. Ambato, *Pachano* 152. Baños, *Hitchcock* 21912. Riobamba, *Mille* 53.

PERU: Goyllarisquisca, *Hitchcock* 22285.

25. Paspalum pallidum H. B. K. Nov. Gen. & Sp. **1**: 88. 1816.

Paspalum pellitum Willd.; Steud. Nom. Bot. ed. 2. **2**: 272. 1841. Not *P. pellitum* Nees 1826. As synonym of *P. pallidum* H. B. K.

Plants perennial, with glabrous, sparingly branching culms 15 to 75 cm. long, decumbent and rooting at the lower nodes; sheaths pilose at the summit or glabrous, the lower much overlapping; blades flat, 4 to 12 cm. long, 5 to 10 mm. wide, puberulent on both surfaces to glabrous, usually ciliate on the margins; panicle 4 to 11 cm. long, of 5 to 20 approximate ascending racemes 2 to 3.5 cm. long, the greenish purple rachis about 2 mm. wide, obscurely puberulent, the solitary, pale or purple spikelets crowded, oblong, glabrous, 2.5 to 3 mm. long, the glume and sterile lemma loose and slightly rumpled.

The second glume is occasionally reduced or wanting in some of the spikelets, and the first glume is occasionally developed.

Brushy banks at middle altitudes, Ecuador and Peru. Originally described from Pintac and Chillo, Ecuador. (*Bonpland.*)

ECUADOR: Quito, *Jameson; Holway* 954; *Harteman* 33. Ambato, *Tate* 530. Between San Lucas and Oña, *Hitchcock* 21528.

PERU: Callao, *Wilkes Expl. Exped.* Matucana, *Macbride & Featherstone* 356.

26. Paspalum decumbens Swartz, Prodr. Veg. Ind. Occ. 22. 1788.

Paspalum pedunculatum Desv.; Poir. in Lam. Encycl. Suppl. 4: 315. 1816.

Panicum decumbens Roem. & Schult. Syst. Veg. **2**: 429. 1817.

A freely branching, decumbent perennial, with slender compressed culms, velvety foliage, the flat blades 5 to 10 cm. long and 5 to 8 mm. wide, and soli-

tary arcuate racemes usually 2 to 3 cm. long, borne on very slender peduncles, these commonly several from the upper sheaths; spikelets obovate, 1.5 mm. long, a small first glume present, the second glume about half the length of the fruit.

Shaded banks and wooded slopes, Central America and the West Indies to Bolivia and Brazil. Originally described from Jamaica.

ECUADOR: Teresita, *Hitchcock* 20413. Between La Chorita and Portovelo, *Hitchcock* 21210.

PERU: Colonia Perené, *Hitchcock* 22061, 22066.

BOLIVIA: Mapiri, *Rusby* 211. Hacienda Simaco, *Buchtien* 5314. Hacienda Casana, *Buchtien* 7105, 7106. Coroico, *Buchtien* 6445; *Hitchcock* 22718.

27. Paspalum inconstans Chase, sp. nov.

Plants perennial; culms in small tufts, ascending from a geniculate base, sometimes rooting at the lower nodes, 45 to 85 cm. long, compressed, glabrous, with leafy flowering branches from the second or third nodes or simple, usually with axillary leafless inflorescences from the upper one or two sheaths; nodes dark, glabrous or with a ring of white hairs; sheaths mostly shorter than the internodes, softly pubescent at least toward the summit and finely ciliate; ligule brown, 1 to 2 mm. long; blades flat, commonly 10 to 15 cm. long, 6 to 13 mm. wide (the uppermost reduced), slightly narrowed to the base, acuminate, from puberulent on both surfaces (the hairs longer at the base) to nearly glabrous; inflorescence terminal and axillary, the terminal finally long-exserted, the common axis 2 to 7 cm. long, slender, the upper joint narrowly winged, slightly pubescent above toward the base, the axillary partly included or short-exserted; racemes 1 to 8, usually 2 to 5 in the terminal inflorescence, 1 or 2 in the axillary, ascending to spreading, 4 to 8 cm. long, the rachis glabrous or obscurely pubescent, 1 mm. wide, narrowly winged, the margins slightly upturned; spikelets in pairs on slender pedicels, the longer pedicel 1.5 to 2 mm. long, loosely imbricate, 2.2 to 3 mm. long (mostly about 2.5 mm.), about 1.2 mm. wide, oblong-elliptic, the first glume commonly developed or rudimentary on the lower of the pair of spikelets, wanting on the upper; second glume and sterile lemma 3-nerved or faintly 5-nerved, the glume shorter and exposing the summit of the fruit, the yellowish hyaline margin sparsely pubescent, the lemma glabrous or obscurely pubescent on the margin, a hyaline palea and staminate flower often developed; fruit slightly smaller than the spikelet, pale, very minutely papillose-striate.

Type in the U. S. National Herbarium, no. 1,164,822, collected at Hacienda Casana, on the road to Tipuani, altitude 1,400 meters, November 19, 1922, by Dr. Otto Buchtien (no. 7107).

This species is variable in the amount of pubescence, in the number of racemes, in the size of the spikelets, and in the presence or absence of the first glume on the lower of the pair of spikelets. In Hitchcock's no. 22734 it is wholly wanting and in Buchtien's no. 7109 it is developed on nearly all of the lower spikelets. In the type the racemes are 2, the spikelets 2.5 to 3 mm. It appears to be related to the species described as *Panicum subfalcatum* by Doell, from the upper Amazon in Brazil, which also has a narrowly winged rachis. A specimen of the type collection of that species was examined at the Kew Herbarium. The spikelets are narrower and the second glume and sterile lemma are pointed beyond the fruit.

Open slopes and roadsides at middle altitudes, Ecuador and Bolivia.

ECUADOR: Between La Chorita and Portovelo, *Hitchcock* 21204.

BOLIVIA: Hacienda Casana, *Buchtien* 7107, 7109, 7111. San José, *Hitchcock* 22734. Sirupaya, *Buchtien* 416. La Florida, *Hitchcock* 22609.

28. Paspalum lepidum Chase, sp. nov.

Plants perennial, in dense tufts with numerous short leafy sterile shoots at the base; culms ascending or spreading, 20 to 45 cm. tall, compressed, sparsely pilose, at least on the uppermost joint, or sometimes glabrous; nodes short-pubescent or the upper glabrous; leaves mostly 3; sheaths carinate, from softly and densely pubescent to glabrous except on the margin and collar; ligule membranaceous, brown, scarcely 1 mm. long; blades flat, mostly 7 to 11 cm. long and 5 to 10 mm. wide, rounded and scarcely narrowed at the base, short-acuminate, densely velvety-pubescent on both surfaces, the hairs longer at the base; inflorescence terminal and axillary, the terminal short-exserted, the common axis 2.5 to 4 cm. long, slender, plano-convex, sparsely pilose, the racemes 3 or 4, the axillary inflorescence of a single peduncle with 2 racemes entirely inclosed in the upper sheath, at least until the maturity of the terminal inflorescence; racemes (of terminal panicle) ascending to spreading, 2 to 5 cm. long; rachis about 0.8 mm. wide, very narrowly winged, the margins upturned, pubescent toward the base; spikelets in pairs on slender, minutely pubescent pedicels (the longer about 1.5 mm. long), imbricate, 2.3 to 2.4 mm. long (rarely only 2 mm.), about 1.1 mm. wide, elliptic, more or less blotched with purple and golden-brown; first glume rarely developed as a minute pointed rudiment; second glume and sterile lemma 5-nerved, the lateral pair of nerves close together near the margin, the glume slightly shorter than the fruit, obscurely pubescent toward the summit and near the margin, the lemma glabrous; fruit pale, very minutely papillose-striate.

Type in the U. S. National Herbarium, no. 1,164,799 collected in "open ground" at Coroico, Nor-Yungas, Bolivia, altitude 1,560 meters, December 25, 1923, by A. S. Hitchcock (no. 22726).

This species is related to *P. inconstans*. It differs chiefly in being densely tufted and in having shorter simple culms with few nodes, and more densely pubescent foliage crowded at the base of the plant.

Open grassland, uplands, Ecuador to Bolivia.

ECUADOR: Between La Chorita and Portovelo, *Hitchcock* 21189.

BOLIVIA: Coroico, *Hitchcock* 22726. San Felipe, *Hitchcock* 22605. Unduavi, *Rusby* 23.

29. Paspalum paniculatum L. Syst. Nat. ed. 10. **2**: 855. 1759.

Paspalum hemisphericum Poir. in Lam. Encycl. **5**: 31. 1804.

Panicum paniculatum Kuntze, Rev. Gen. Pl. **3**²: 363. 1898.

A weedy branching perennial, commonly a meter or more tall, the foliage harshly pubescent, the flat blades 20 to 30 cm. long, about 1.5 cm. wide; racemes very numerous, slender, crowded in an oblong panicle, the minute crowded subhemispheric spikelets pubescent. Exceedingly variable in size and in the amount of pubescence.

Savannas and open or partly shaded, mostly moist ground, Mexico and the West Indies to Bolivia and Argentina. Originally described from Jamaica.

ECUADOR: Milagro, *Hitchcock* 20180. "Reg. subtrop.," *Sodiro* 299.

PERU: Colonia Perené, *Hitchcock* 22072. La Merced, *Hitchcock* 22132. "Andes," *Pöppig* 957.

BOLIVIA: Mapiri, *Rusby* 198; *Buchtien* 1164. Hacienda Simaco, *Buchtien* 5323. Coroico, *Buchtien* 6435; *Hitchcock* 22722. Hacienda Anacuri, *Holway*

726. Milluhuaya, *Buchtien* 4196, 4269. Sirupaya, *Buchtien* 415. La Florida, *Holway* 680; *Hitchcock* 22624, 22627. Antahuacana, *Buchtien* 6436.

30. Paspalum juergensii Hack. Repert. Nov. Sp. Fedde **7**: 312. 1909.

Paspalum quitense Mez, Repert. Nov. Sp. Fedde **15**: 70. 1917. (Ambato. *Spruce.*)[35]

Resembling *P. paniculatum*, on the average less coarsely pubescent; panicle with fewer laxer racemes, the spikelets slightly larger and not so blunt, the sterile lemma glabrous.

Moist open ground, Ecuador, Bolivia, and southern Brazil. Originally described from Brazil.

ECUADOR: Valley of Pastaza River, between Baños and Cashurco, *Hitchcock* 21749, 21842.

BOLIVIA: "Yungas," *Bang* 308.

31. Paspalum tenellum Willd. Enum. Pl. 89. 1809.

An erect perennial, with compressed culms in small tufts, velvety or sometimes glabrescent foliage, the flat blades 5 to 20 cm. long and 5 to 15 mm. wide, rounded at base, and 2 to several widely spreading, thick racemes rather distant on a slender axis, the paired crowded obovate spikelets 2 mm. long, densely pubescent with short crinkly hairs, at first stramineous, becoming dull dark purple.

Open dry slopes at middle altitudes, Mexico, Central America, Brazil, and Ecuador. Originally described from a botanical garden specimen, the source unknown, Mexico conjectured. Hitchcock's no. 21464 is a depauperate plant, the tallest culm only 21 cm.; the foliage is less pubescent than in North American plants, but the spikelets are identical.

ECUADOR: Near the high pass between Loja and San Lucas, *Hitchcock* 21464.

32. Paspalum multicaule Poir. in Lam. Encycl. Suppl. **4**: 309. 1816.

Paspalum papillosum Spreng. Nov. Prov. Hal. 47. 1819.

A low annual, profusely branching from the base and lower nodes, the sheaths and narrowly linear blades pilose; racemes a pair at the summit of the culm (rarely solitary), divergent, slender, about 3 cm. long, the minute pale orbicular spikelets irregularly sprinkled with globular hairs, these often wanting on some of the spikelets but present on some on each plant.

Moist savannas and open ground, West Indies and British Guiana to Brazil and Bolivia. Originally described from Brazil.

PERU: Colonia Perené, *Hitchcock* 22087.

BOLIVIA: Tipuani, *Bang* 1426a.

32A. Paspalum pictum Ekman, Ark. för Bot. **10**[17]: 11. *pl. 1. f. 6.* 1911.

Similar to *P. multicaule*, the racemes on the branches frequently solitary; spikelets scarcely 1 mm. long, the glume and sterile lemma narrower than the minutely papillose fruit.

Open moist ground, Costa Rica to Brazil, whence originally described.

BOLIVIA: Buena Vista, *Steinbach* in 1916 (comm. *Osten* while this work was in press).

33. Paspalum gossipinum Mez, Repert. Nov. Sp. Fedde **15**: 68. 1917.

A densely tufted perennial, with slender erect simple culms 35 to 50 cm. tall, leafy toward the base, the foliage densely clothed with long soft spread-

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[35] Spruce journeyed up the valley of Pastaza River on his way to Ambato. It is probable that his specimen was collected in the valley, not at the altitude of Ambato.

ing white hairs, the blades 4 to 10 cm. long and 1.5 to 2 mm. wide; racemes 2 to 5, ascending to spreading, 3 to 5 cm. long, on a slender axis 1 to 2 cm. long; rachis slender, with long white hairs on the margin and upper side; spikelets solitary, about 1.2 mm. long, yellowish, glabrous, the glume and sterile lemma hyaline in the middle, readily tearing.

Mountain slopes. Known only from the type.

PERU: "Montis Morro prope Moyobamba, dept. Loreto, alt. 900–1000 M.," *Weberbauer* 4590.

34. **Paspalum microstachyum** Presl, Rel. Haenk. 1: 215. 1830.

Paspalum effusum Nees, Journ. Bot. Kew Misc. 2: 104. 1850.

Paspalum cognatissimum Steud. Syn. Pl. Glum. 1: 18. 1854. (*Jameson* 552.)

A nearly glabrous annual, with slender erect culms usually 15 to 50 cm. tall, in small tufts, branching from the second or third nodes; blades flat, spreading, 4 to 15 cm. long, 8 to 20 mm. wide; panicle mostly 10 to 20 cm. long, of 7 to 25 or more spreading racemes, the elliptic, yellowish green spikelets about 1.5 mm. long and 0.8 to 0.9 mm. wide, minutely pubescent.

Roadsides, waste places, and cultivated ground, at low altitudes, Guatemala to Ecuador and Brazil. Originally described from a specimen collected by Haenke, the locality unknown.

ECUADOR: Balao, *Jameson* 371 (Kew Herb.). Guayaquil, *Jameson* 552. Milagro, *Hitchcock* 20177. Between Santa Rosa and La Chorita, *Hitchcock* 21138.

35. **Paspalum inaequivalve** Raddi, Agrost. Bras. 28. 1823.

Paspalum inaequivalve var. *glabriflorum* Hack. in Stuck. Anal. Mus. Nac. Buenos Aires 21: 23. 1911.

A slender perennial, with flat, widely trailing culms with stilt roots at the lower nodes, and suberect branches; foliage sparsely papillose-pilose to nearly glabrous, the flat blades mostly 8 to 25 cm. long and 10 to 18 mm. wide, clasping at base; panicles 10 to 25 cm. long, of 5 to 15 laxly spreading racemes, the lower distant, the elliptic spikelets 2 mm. long, the glume and sterile lemma minutely pubescent to nearly glabrous, the glume about half the length of the sterile lemma and the pale shining fruit.

Among shrubs and in shady places, Brazil, whence originally described, and Bolivia to Argentina.

BOLIVIA: Milluhuaya, *Hitchcock* 22672. Coripata, *Hitchcock* 22691. Coroico, *Buchtien* 3614.

In the variety *glabriflorum*, described from Argentina, the spikelets are nearly glabrous, as they are in Bolivian specimens. In the type specimen of *P. inaequivalve* the spikelets are finely pubescent, but plants with nearly glabrous spikelets are the commoner, even in Brazil.

36. **Paspalum orbiculatum** Poir. in Lam. Encycl. 5: 32. 1804.

Paspalum pusillum Vent.; Flügge, Monogr. Pasp. 100. 1810.

A glabrous creeping perennial, with ascending flowering branches 10 to 20 cm. tall, the delicate culms finally branching; blades flat, spreading, mostly 1.5 to 4 cm. long, 4 to 7 mm. wide; racemes 2 or 3, short-exserted, 4 to 5 mm. distant, 1 to 2 cm. long, the minute spikelets pale yellow.

Wet places, southern Mexico and the West Indies to Ecuador and Paraguay. Originally described from Porto Rico.

ECUADOR: Balao, *Eggers* 14668. Teresita, *Hitchcock* 20434. Milagro, *Hitchcock* 20202. Portovelo, *Hitchcock* 21257.

37. **Paspalum haenkeanum** Presl, Rel. Haenk. 1: 210. 1830.

A straggling or creeping perennial, with elongate leafy culms and somewhat glaucous foliage, the sheaths overlapping, the flat spreading blades 4 to 8 cm.

long (rarely longer) and 6 to 9 mm. wide, rounded at base, pubescent at the junction with the sheath and mostly puberulent beneath; racemes 3 to 5, aggregate, ascending, 2 to 4.5 cm. long, rather thick, the flat rachis glabrous; spikelets broadly ovate, the glume and sterile lemma equal, covering the fruit.

Known only from Peru. None of the labels seen give the habitat. Originally described from the mountains of Huânuco. (*Haenke.*)

PERU: Callao, *Wilkes Expl. Exped.* Lima, *Barranca* 537. Santa Clara, *Holway* 786.

38. Paspalum conjugatum Bergius, Act. Helv. Phys. Math. **7:** 129. 1762.

An extensively creeping perennial, with compressed culms, the suberect flowering branches sometimes 1 meter tall; blades flat, rather thin, up to 20 cm. long, commonly about 8 mm. wide; racemes a pair (rarely a third below), widely divaricate, usually arcuate, slender, commonly 10 to 12 cm. long, the pale yellow, flattened, imbricate spikelets about 1.5 mm. long, with scant long silky hairs around the margin.

Common in moist ground, Gulf States to Bolivia and Argentina; also in the tropics of the Old World. Originally described from Dutch Guiana.

ECUADOR: Balao, *Eggers* 14646. Guayaquil, *Mille* 304. Milagro, *Hitchcock* 20161, 20599. Tenguel, *Holmgren* 58.

PERU: Callao, *Wilkes Expl. Exped.* Chosica, *Macbride & Featherstone* 506. Colonia Perené, *Hitchcock* 22089. Without locality, *Lechler* 2275.

BOLIVIA: Rurrenabaque, *Cárdenas* (*Mulford Biol. Expl.*) 1175. Buena Vista, *Steinbach* 5160. Río Surutú, *Steinbach* 6836. Mapiri, *Buchtien* 1162. Hacienda Simaco, *Buchtien* 5325. Coroico, *Buchtien* 2504a. La Florida, *Hitchcock* 22633. Antahuacana, *Buchtien* 2504.

39. Paspalum notatum Flügge, Monogr. Pasp. 106. 1810.

Culms tufted, ascending from a short hard rhizome, forming tough mats, the leaves crowded at base, the blades flat, 5 to 8 mm. wide, often elongate; racemes 2, approximate, diverging, usually arcuate; spikelets solitary, broadly ovate, 2.5 to 3 mm. long, the glume and sterile lemma papery, shining.

Open slopes and pastures, mostly at low altitudes, Mexico and the West Indies to Argentina. Originally described from St. Thomas, West Indies.

BOLIVIA: Buena Vista, *Steinbach* 5273, 7020.

40. Paspalum melanospermum Desv.; Poir. in Lam. Encycl. Suppl. **4:** 315. 1816.

Paspalum olivaceum Hitchc. & Chase, Contr. U. S. Nat. Herb. **18:** 310. 1917.

A nearly smooth, spreading annual, the culms ascending or erect from a decumbent base, 30 to 60 cm. tall, with lax flat blades, and 4 to 6 arcuate ascending racemes 1.5 to 3 cm. long, the axis 3 to 5 cm. long; spikelets 2 mm. long, more or less wrinkled on the flat side.

Open moist sandy soil, Guadeloupe to Brazil and Bolivia. Originally described from French Guiana.

BOLIVIA: Buena Vista, *Steinbach* 5459.

41. Paspalum plicatulum Michx. Fl. Bor. Amer. **1:** 45. 1803.

Paspalum undulatum Poir. in Lam. Encycl. **5:** 29. 1804.

A tufted suberect perennial 0.5 to 1 meter tall, with compressed simple culms, linear blades 5 to 10 mm. wide, sometimes sparsely pilose, and few to several arcuate-spreading racemes 4 to 8 cm. long, the spikelets in pairs, drab-colored, drying brown, oval; fruit dark brown, shining.

Open slopes, banks, along streams, mostly in moist soil, southeastern United States to Bolivia and Argentina. Originally described from Georgia and Florida.

BOLIVIA: Coripata, *Hitchcock* 22675. Río Piray, *Herzog* 1345. Buena Vista. *Steinbach* 6873, 7036.

42. Paspalum pubifolium Presl, Rel. Haenk. 1: 219. 1830.

Resembling *P. plicatulum* and doubtfully distinct, the blades densely pubescent beneath, long pilose above, the sterile lemma not undulate or an occasional one obscurely so.

Wet meadows, Peru. Originally described from the mountains of Huánuco. (*Haenke.*)

PERU: Colonia Perené, *Hitchcock* 22098.

The type was examined in the National Museum at Prague, and a photograph of it is in the United States National Herbarium. This plant agrees with Presl's description in having short blades clustered at the base, and only 3 racemes. The specimen cited above, the only one seen from Peru, has blades as much as 25 cm. long and resembles *P. plicatulum* generally, except that the sterile lemmas are not undulate, the spikelets being exactly like those of Haenke's plant.

43. Paspalum collinum Chase, sp. nov.

Perennial in small clumps; culms simple, ascending or spreading 30 to 65 cm. tall, flattened, glabrous; nodes dark, glabrous; leaves somewhat crowded toward the base, about four sheaths overlapping and two distant, the sheaths carinate, bearing a few stiff hairs on the margin at the summit, otherwise glabrous; ligule membranaceous, brown, about 1.5 mm. long; blades rather firm, flat, 12 to 20 cm. long, 6 to 9 mm. wide, rounded and scarcely or not at all narrowed at the base, rather short-acuminate, bearing long stiff hairs back of the ligule and sparsely stiff-ciliate, otherwise glabrous; inflorescence rather livid-purplish, long-exserted on a very flat peduncle, the common axis 4.5 to 5.5 cm. long, slender, plano-convex, glabrous; racemes 4 (in the only specimen seen), ascending or spreading, 2 to 6 cm. long; rachis triangular, about 0.7 mm. wide, with a tuft of stiff hairs at the base, otherwise glabrous; spikelets on minute glabrous pedicels, in pairs, closely imbricate, 2.5 mm. long, 1.5 mm. wide, elliptic-obovate, the glume and sterile lemma thin in texture, equal, covering the fruit, 5-nerved, the lateral pair of nerves close together near the margin, appressed-pubescent, the hairs a little longer and spreading toward the margins and summit; fruit almost as large as the spikelet, dark brown, minutely papillose-striate, with a few obscure hairs toward the summit and margin of the lemma.

Type in the U. S. National Herbarium, no. 1,164,831, collected in "moist grassy place," Coroico, Nor-Yungas, Bolivia, altitude 1,560 meters, December 25, 1923, by A. S. Hitchcock (no. 22723).

This species belongs to the *Plicatula* group, but the spikelets are less strongly convex on the back and the glume and sterile lemma are thinner in texture than in the other species, and there is no suggestion of wrinkles within the margin of the sterile lemma. In the lack of wrinkles and in pubescence the spikelets resemble those of *P. pubifolium* Presl, but they are longer, less blunt, and have looser longer pubescence toward the summit and margin.

Known only from the type specimen.

44. Paspalum virgatum L. Syst. Nat. ed. 10. 2: 855. 1759.

A robust erect perennial growing in large clumps 1.5 to 2 meters tall, the lower sheaths nodulose in drying; blades commonly 50 cm. long or more, 1 to 2 cm. wide, flat, the margins very scabrous; racemes several to many, 5 to 12 cm. long, forming a panicle 20 to 40 cm. long; spikelets in pairs, crowded,

grayish, becoming rusty brown at maturity, obovate, 3 mm. long, 2 mm. wide, silky-hairy around the margin.

Open, mostly moist or swampy ground, Mexico and the West Indies to Bolivia and Argentina, at rather low altitudes. Originally described from Jamaica.

PERU: Colonia Perené, *Hitchcock* 22073, 22102. Santa Ana, *Cook & Gilbert* 1531.

BOLIVIA: Hacienda Anacuri, *Holway* 703. Coripata, *Hitchcock* 22696.

45. Paspalum millegrana Schrad. in Schult. Mant. 2: 175. 1824.

Culms in large strong-rooted clumps, commonly 1.5 meters tall; sheaths nodulose, much overlapping; blades partially conduplicate, narrower, stiffer, and more scabrous than those of *P. virgatum*, often finely pubescent on the upper surface; racemes usually numerous, rather aggregate, ascending, the paired crowded spikelets usually glaucous-purplish or lead color, obovate-suborbicular, sometimes almost obcordate and apiculate.

Open moist ground, West Indies to Brazil, whence originally described, and eastern Bolivia, mostly at low altitudes.

BOLIVIA: Reyes, *Cárdenas* (*Mulford Biol. Expl.*) 1656.

Cárdenas's no. 1656 differs from typical *P. millegrana* in having a few obscure hairs at the summit of the spikelets.

46. Paspalum densum Poir. in Lam. Encycl. 5: 32. 1804.

Like *P. millegrana* in habit, the culms and sheaths more lush and in drying more strongly nodulose; racemes 4 to 6 cm. long, very numerous, aggregate in an elongate-pyramidal panicle, the light brown, glabrous, densely crowded spikelets 1.8 to 2 mm. long, nearly as broad.

Wet savannas and campos, West Indies and Panama to Brazil and eastern Bolivia. Originally described from Porto Rico.

BOLIVIA: Reyes, *White* 1499. Buena Vista, *Steinbach* 6898.

47. Paspalum macrophyllum H. B. K. Nov. Gen. & Sp. 1: 92. 1816.

Paspalum lehmannianum Pilger, Bot. Jahrb. Engler 25: 709. 1898.

A large-leaved perennial, with ascending glabrous culms, 50 to 75 cm. long, solitary or in small tufts, loose sheaths, papillose-pilose toward the summit or glabrous, flat blades commonly 12 to 25 cm. long and 1.2 to 2 cm. wide, rounded at base, long-pilose above the ligule and ciliate at least toward the base, otherwise glabrous or finely pubescent beneath, and 3 to 9 spreading racemes 3.5 to 5 cm. long, on a slender axis, mostly rather distant, with imbricate, dull brown, ovoid-oval spikelets, the glume and sterile lemma equal, covering the pale fruit, the glume finely pubescent, the sterile lemma glabrous or nearly so.

Wood borders, edges of clearings, and moist shady places, at middle altitudes, Colombia and Ecuador. Originally described from Colombia.

ECUADOR: Between Otavalo and Malchinguí, *Hitchcock* 20832. "Subtrop. 1200 m." *Sodiro* 299½.

48. Paspalum barclayi Chase, sp. nov.

Plant presumably perennial (the base wanting); culm simple, robust, 70 cm. to probably 1 meter or more tall, leafy toward the summit, compressed and sulcate, glabrous; nodes dark, with a sparse tuft of long stiff white fragile hairs on the edges or glabrate; leaves more than four, the sheaths compressed, carinate, ciliate with long fragile hairs on the margin especially toward the summit, otherwise glabrous; ligule membranaceous, brown, 1.5 to 2 mm. long; blades firm, flat, 10 to 21 cm. long, 1 to 2 cm. wide (the uppermost greatly reduced), rounded at the base, scabrous on the margins and with long hairs at the very

base, otherwise glabrous; inflorescence short-exserted or included at base, purplish brown, the common axis 5 to 8 cm. long, plano-convex to angled and sulcate, glabrous; racemes 6 to 10, rather crowded, ascending, 3.5 to 8 cm. long, thick and dense; rachis about 1 mm. wide at base, tapering to the summit, scabrous on the margins and with a long tuft of stiff hairs at the base; spikelets on minute slender pedicels, in pairs, closely imbricate, 2.8 to 3 mm. long, about 1.5 mm. wide, ovate-elliptic, the glume and sterile lemma thin in texture, equal, forming a short abrupt point beyond the fruit, 5-nerved, the lateral pair of nerves near the margin (those of the lemma close together), the glume sparsely pubescent with long fine appressed hairs, the hairs more copious along the margin toward the summit, accentuating the pointed apex, the lemma glabrous; fruit pale, 2.3 to 2.5 mm. long, about 1.3 mm. wide, elliptic, very minutely papillose-striate.

Type in U. S. National Herbarium, no. 601295, collected in the fields near Callao, Peru, soil light loam, in "1836–41" by George Barclay (no. 311).

The type, the only known specimen, consists of three culms with inflorescences but all lacking the base. It is related to *P. macrophyllum* H. B. K. but has longer, minutely pointed, less turgid spikelets in stiffer racemes in a more crowded panicle.

49. Paspalum remotum Remy, Ann. Sci. Nat. III. Bot. **6**: 349. 1846.

A glabrous perennial, with decumbent compressed angular culms 25 to 100 cm. long, ascending from a creeping base, smooth sheaths mostly overlapping, flat blades 5 to 20 cm. long and 5 to 10, rarely 12 mm. wide, very scabrous on the margins, and a terminal panicle of 2 to 5 thick nodding racemes 2.5 to 9 cm. long, on a slender axis 2 to 10 cm. long, a single raceme on a leafless peduncle commonly borne in the upper sheath; spikelets in pairs, oval, 3.1 to 3.4 mm. long, about 2 mm. wide, finely pubescent.

Along ditches and in moist places, at middle altitudes, Bolivia. Originally described from Cotagna [Cotaña] below Illimani. (*Pentland.*)

BOLIVIA: Sorata, *Mandon* 1252; *Bang* 1312. "Yungas" *Rusby* 30. Cochabamba, *Buchtien* 2509; *Holway* 336; *Hitchcock* 22807.

50. Paspalum fasciculatum Willd. in Flügge, Monogr. Pasp. 69. 1810.

Paspalum fasciculatum var. *glabratum* Doell in Mart. Fl. Bras. **2**: 91. 1877.

A large, extensively creeping perennial, the compressed culms as much as 1 cm. wide and several meters long, the bases forming a tangled mass, the erect flowering culms 1 to 2 meters tall; sheaths densely silky-ciliate, at least toward the summit; blades flat, 30 to 60 cm. long, commonly 2 cm. wide, the margins very scabrous; racemes 10 to 12 cm. long, numerous, aggregate in a fan-shaped panicle; spikelets 4 mm. long, 1.5 mm. wide, acuminate.

Stream banks and swamps, southern Mexico, Colombia, and Dutch Guiana to Argentina. Described from Brazil, with a variety β from Peru, collected by Humboldt and Bonpland. This collection in the Berlin Herbarium is marked, "Habitat in Peruv. Hum. 3813, gamalote." In the Paris Herbarium is a specimen marked "Bonpl. 3813, Guayaquil." In the Humboldt, Bonpland, and Kunth Herbarium, kept apart, in the Paris Herbarium is a specimen labeled "Guayaquil, San Borodon & Estero del Lagarto." These specimens are rather small plants, but are the same species as the type from Brazil. Kunth [36] redescribes *P. fasciculatum*, citing the Humboldt and Bonpland collection from "Guayaquil, San Borondon et Estero del Lagarto." He states that he has not seen var. α (the specimen from Brazil).

ECUADOR: Balao, *Eggers* 14104.

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[36] H. B. K. Nov. Gen. & Sp. **1**: 89. 1816.

51. Paspalum pilosum Lam. Tabl. Encycl. 1: 175. 1791.

Panicum monostachyum H. B. K. Nov. Gen. & Sp. 1: 96. 1816.

An ascending to spreading perennial, in small tufts, the compressed culms 40 to 75 cm. long, the foliage mostly coarsely pubescent, the flat or somewhat revolute blades commonly 8 to 15 cm. long and 5 to 8 mm. wide; racemes solitary, terminal and axillary, 10 to 15 cm. long, erect-arcuate; spikelets in pairs, oblong-elliptic, the first glume usually well developed on the lower of the pair of spikelets, the second glume and sterile lemma firm in texture.

Savannas and brushy slopes, Costa Rica to Brazil and Bolivia. Originally described from tropical America, the particular locality not known.

ECUADOR: Portovelo, *Hitchcock* 21269.

BOLIVIA: Hacienda Casana, *Buchtien* 7108.

Buchtien's no. 7108 differs from the typical form in having glabrous blades 10 to 12 mm. wide, rounded at the base, and sheaths ciliate on the margin, otherwise glabrous.

52. Paspalum ekmanianum Henr. Med. Rijks Herb. Leiden 40: 49. 1921.

An erect perennial, with slender simple culms in small tufts, scant foliage, the sheaths ciliate, the narrow erect subinvolute blades 5 to 10 cm. long, papillose-pilose on the upper surface, the long hairs fragile and breaking off, and a single slender pale woolly subfalcate raceme 12 to 13 cm. long, the slender axis glabrous; spikelets in pairs, imbricate, oblong-elliptic, 2 mm. long, excluding the hairs, the equal glume and sterile lemma densely clothed with somewhat crinkled, white hairs twice as long as the spikelet.

Sandy open ground at 450 to 500 meters, eastern Bolivia. (Type, *Herzog* 1654.)

BOLIVIA: Lomas, west of Rfo Piray, *Herzog* 1654. Buena Vista, *Steinbach* 5320, 6923 (one culm with 2 racemes).

53. Paspalum malacophyllum Trin. Gram. Icon. 3: *pl. 271*. 1831.

A tall, more or less purplish, often robust perennial in large clumps with suberect culms 1 to 2 meters tall, branching after the maturity of the primary panicle; sheaths mostly sparsely papillose-pilose and with long hairs in the throat; blades flat, mostly 15 to 25 cm. long and 10 to 25 mm. wide (smaller on the branches), velvety beneath; panicles 12 to 25 cm. long, of numerous ascending to spreading, subverticillate racemes 3 to 8 cm. long, the rachis sparsely ciliate, the mauve-purple or tawny, imbricate spikelets 1.7 to 2 mm. long.

On open grassy slopes at middle altitudes, Bolivia and Brazil, whence originally described, to Argentina.

BOLIVIA: Samaipata, *Herzog* 1756, 1836. Hacienda Casana, *Buchtien* 7110.

54. Paspalum boliviense Chase, sp. nov.

Plants perennial: culms solitary or few in a clump, erect, simple or producing leafy shoots from the second to the fourth nodes, 1 to 1.5 meters tall, terete, mostly dull purple, glabrous; nodes glabrous or sometimes pilose; leaves about 6, the sheaths more or less keeled, glabrous or pilose at the very base only; ligule membranaceous, 1 to 2 mm. long; blades rather firm, flat, mostly 10 to 20 cm. long and 8 to 20 mm. wide (the uppermost greatly reduced and those of the sterile branches commonly longer and narrower), the upper rounded at base, the lower tapering to a base narrower than the summit of the sheath, all pilose at the very base and long-acuminate to a fine point, the margins scabrous and some of them with a few scattered hairs, the blades otherwise glabrous; inflorescence rather long-exserted, at first whitish, turning mauve-purple, mostly 10 to 18 cm. long and 3 to 5 cm. wide, the common axis slender,

sharply angled, glabrous; racemes commonly 8 to 25 (rarely 30 or more), from narrowly ascending to arched-spreading, 1.5 to 6 cm. long; rachis about 1 mm. wide, with a tuft of long hairs in the axil, the margins scabrous and usually with a few scattered long hairs; spikelets on minute slender pedicels, in pairs, imbricate, 2 to 2.2 mm. long, about 1 mm. wide, elliptic, concavo-convex; both glumes wanting, the sterile lemma as long as the fruit, but narrowerer, thin in texture with 3 strong nerves, glabrous, closely appressed to the concave fertile palea; lemma and palea papillose-striate, the papillae glistening under a lens, the fertile lemma mauve-purple, strongly convex or almost gibbous, with 7 prominent equidistant longitudinal ridges.

Type in U. S. National Herbarium, no. 1,099,153, collected near Sorata, Bolivia, in May, 1892, by Miguel Bang (no. 1306).

This species is allied to *Paspalum malacophyllum* Trin., *P. elongatum* Griseb., and *P. simplex* Morong. It differs from all in having larger spikelets with more strongly papillose fruit. The racemes are shorter than those of any of these except in occasional specimens.

Open rocky slopes, Andes of Bolivia, between 2,500 and 3,000 meters altitude.

BOLIVIA: Sorata, *Bang* 1306; *Holway* 516. Cochabamba, *Hitchcock* 22866; *Holway* 331, 374½. Without locality, *D'Orbigny* 166.

55. Paspalum saccharoides Nees in Trin. Gram. Icon. 1: *pl. 107*. 1828.

Panicum saccharoides Kunth, Rév. Gram. 1: 237. *pl. 30*. 1830.

Moenchia speciosa Wender.; Steud. Nom. Bot. ed. 2. 2: 153. 1841.

A robust tufted stoloniferous perennial, the branching culms often 2 meters tall, the long flat blades 1 to 1.5 cm. wide, involute toward the apex, pale and appressed-pubescent on the upper surface; racemes numerous, commonly 15 cm. or more long, slender, drooping, forming a feathery panicle, the small narrow spikelets margined with silky white hairs 6 to 8 mm. long, the general appearance unlike that of any other species of *Paspalum*.

Banks and steep slopes, Costa Rica and the Lesser Antilles to Bolivia and Brazil. Originally described from St. Christopher.

ECUADOR: Huigra, *Rose* 22645. Between Huigra and Naranjapata, *Hitchcock* 20652. Between Baños and Cashurco, *Hitchcock* 21761.

PERU: Chicoplaya, *Ruiz*.

BOLIVIA: Coripata, *Hitchcock* 22686. Antahuacana, *Buchtien* 2513.

The following species we have been unable to identify:

PASPALUM ANDERSSONII Mez, Repert. Nov. Sp. Fedde 15: 71. 1917. Collected by Andersson in Peru, the particular locality not known.

PASPALUM CASTANEUM Remy, Ann. Sci. Nat. III. Bot. 6: 348. 1846. Collected by D'Orbigny at "Garulazo, prope Chuquisaca," Bolivia. The description suggests a hirsute specimen of *Paspalum convexum* Flügge, which is not known from Bolivia, but the Department of Chuquisaca is scarcely known botanically.

PASPALUM IBARRENSE Sodiro, Anal. Univ. Quito 1889: 4. [1889?] A name only, "En la provincia Imbabura. Raro." No specimen so named was found in the Sodiro Herbarium at Quito.

PASPALUM MARGINATUM Remy, Ann. Sci. Nat. III. Bot. 6: 348. 1846. Not *P. marginatum* Trin. *Paspalum remyi* Steud. Syn. Pl. Glum. 1: 28. 1854. Based on *P. marginatum* Remy, not Trin. Collected by D'Orbigny "in locis vulgo Pampas Sti Joaquin." We are unable to locate the place cited. The description suggests *Paspalum cujabense* Trin., a narrow-leaved species related to *P. ceresia* (Kuntze) Chase, not known from Bolivia.

95. PANICUM L.

Inflorescence paniculate (rarely racemose); spikelets pedicellate, biconvex; first glume present; sterile lemma usually inclosing a hyaline palea, sometimes a staminate flower; fruit chartaceous-indurate, the margins of the lemma inrolled.

Spikelets short-pediceled along one side of the panicle branches forming more or less spikelike racemes, these arranged along a simple axis.

Fruit transversely rugose. Spreading or creeping; spikelets glabrous.

Plants perennial. Spikelets not reticulate-veined.

Nodes glabrous ..... 1. P. geminatum.

Nodes bearded ..... 2. P. barbinode.

Plants annual.

Spikelets glabrous, reticulate-veined.

Spikelets turgid, scarcely flattened, reticulate-veined on the upper half ..... 3. P. fasciculatum.

Spikelets plano-convex, reticulate-veined only at tip .. 4. P. ramosum.

Spikelets hispid, not reticulate ..... 5. P. echinulatum.

Fruit not rugose.

Blades lanceolate or ovate-lanceolate.

Spikelets hispid and with 2 crateriform glands on the sterile lemma. 24. P. pulchellum.

Spikelets glabrous, glandless. Glumes strongly carinate.

Blades not more than 5 cm., usually 2 to 3 cm., long; second glume rather blunt and shorter than the sterile lemma. 22. P. stoloniferum.

Blades 5 to 11 cm. long; second glume acute, nearly equaling the sterile lemma ..... 23. P. frondescens.

Blades linear, often elongate.

Rachis pilose with long hairs ..... 19. P. pilosum.

Rachis without long hairs.

Nodes bearded ..... 18. P. polygonatum.

Nodes glabrous.

Blades narrowed at the base, not cordate ..... 20. P. laxum.

Blades not narrowed at the somewhat cordate base. 21. P. boliviense.

Spikelets in open or contracted panicles, if somewhat racemose along the branches not in one-sided racemes.

Fruit finely transversely rugose.

Culms with a cormlike base ..... 16. P. bulbosum.

Culms without a cormlike base ..... 15. P. maximum.

Fruit not transversely rugose.

Sterile lemmas 2 ..... 13. P. quadriglume.

Sterile lemma 1.

Plants annual.

Spikelets plano-gibbous, the second glume swollen, bristly and burlike. First glume nearly as long as the minute spikelet .. 44. P. hirtum.

Spikelets not plano-gibbous nor burlike.

Blades ovate-lanceolate or elliptic, one-fifth to one-fourth as broad as long; spikelets not more than 1.5 mm. long. Plants low. 26. P. trichoides.

Blades linear or narrowly lanceolate, many times longer than broad; spikelets 2.5 to 3.5 mm. long.

Panicles terminal and axillary ..... 9. P. cayennense.

Panicles terminal only.
First glume more than half the length of the spikelet, acuminate.
10. P. hirticaule.
First glume one-third the length of the spikelet, bluntish.
11. P. stramineum.
Plants perennial.
First glume not more than one-fourth as long as the spikelet, usually obtuse or truncate.
Spikelets 2 mm. long, obtuse, clustered toward the ends of the nearly simple panicle branches----25. P. schiffneri.
Spikelets 2 to 5 mm. long, acute, panicle branches compound.
Spikelets 4 to 5 mm. long, acuminate----8. P. elephantipes.
Spikelets 3 mm. long----6. P. aquaticum.
Spikelets 2 mm. long----7. P. chloroticum.
First glume more than one-third as long as the spikelet.
Spikelets viscid, 3 mm. long, obtuse----28. P. glutinosum.
Spikelets not viscid.
Panicle 40 to 60 cm. long, the branches in verticils. Spikelets 3.5 mm. long, turgid----45. P. megiston.
Panicle usually much less than 40 cm. long, the branches not in verticils.
Culms erect or spreading but not much branched or straggling. (See also 47. *P. procurrens*, with white-margined blades and spikelets 4 mm. long.)
Spikelets 6 to 7 mm. long.
Spikelets glabrous----46. P. olyroides.
Spikelets silky-villous----34. P. urvilleanum.
Spikelets less than 4 mm. long.
Spikelets about 3.5 mm. long, turgid, sparsely hirsute with stiff hairs----33. P. rudgei.
Spikelets not more than 3 mm. long.
Glumes subequal, much shorter than the spikelet.
41. P. versicolor.
Glumes unequal, the second as long as the spikelet.
Culms a meter or more tall.
Sheaths hirsute; rhizome wanting--14. P. hirsutum.
Sheaths glabrous; rhizome stout.
17. P. tricholaenoides.
Culms mostly less than 0.5 meter tall.
Panicle 20 to 30 cm. long----12. P. ghiesbreghtii.
Panicle not more than 10 cm. long.
Plants pubescent.
Spikelets oval 1.5 cm. long--30. P. obtusiglume.
Spikelets elliptic, 2 mm. long----36. P. sciurotis.
Plants glabrous----37. P. stigmosum.
Culms much branched, straggling.
Spikelets 5 to 7 mm. long.
Spikelets glabrous, 5.5 to 6 mm. long----42. P. zizanioides.
Spikelets velvety, 7 mm. long----43. P. paucispicatum.
Spikelets 4 mm. long or less.
Spikelets 1.3 to 1.5 mm. long.

First glume one-fifth as long as spikelet.
27. P. trichanthum.
First glume more than half as long as spikelet.
31. P. parvifolium.

Spikelets 2 to 4 mm. long.
Spikelets 3 to 4 mm. long.
Spikelets 4 mm. long, pilose. Blades white-margined.
47. P. procurrens.
Spikelets 3 mm. long. Blades glabrous.
40. P. cordovense.

Spikelets 2 to 2.5 mm. long.
Spikelets short-pediceled toward the ends of the panicle branches----------**29. P. sellowii.**
Spikelets evenly distributed in the panicle.
Spikelets 2.5 mm. long----------**39. P. polycladum.**
Spikelets 2 mm. long.
Blades pubescent----------**38. P. pantrichum.**
Blades glabrous.
Blades lanceolate, as much as 1.5 cm. wide, somewhat spreading, pubescent on the collar.
35. P. hebotes.
Blades linear-lanceolate, mostly less than 6 mm. wide, appressed, glabrous on the collar.
32. P. caaguazuense.

1. Panicum geminatum Forsk. Fl. Aegypt. Arab. 18. 1775.

A glabrous perennial 50 to 100 cm. tall, with a narrow panicle of short appressed racemes.

Moist ground or in shallow water, mostly near the coast, southern Florida and Texas to Brazil and Peru; also in the warmer parts of the Old World. Originally described from Egypt.

ECUADOR: Guayaquil, *Hitchcock* 19916.

PERU: Lima, *Wilkes Expl. Exped.* River Chira, *Spruce* 6424 (Kew Herb.).

2. Panicum barbinode Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 1: 256. 1834.
PARÁ GRASS.

A tall perennial, with long branching decumbent bases and long stolons, pubescent nodes, glabrous blades, and several racemes on an axis 15 to 20 cm. long, the lower as much as 5 to 10 cm. long and more or less branching, the glabrous spikelets 3 mm. long.

Cultivated and waste grounds at low altitudes, especially in moist places, tropical America, where it appears to be introduced, probably from Africa. Originally described from Brazil.

ECUADOR: Guayaquil, *Hitchcock* 19914. Milagro, *Hitchcock* 20199. Without locality, *Lehmann* 5744 (Kew Herb.).

PERU: Santa Clara, *Rose* 18630; *Holway* 790. Santa Ana, *Cook & Gilbert* 1427, 1530.

3. Panicum fasciculatum Swartz, Prodr. Veg. Ind. Occ. 22. 1788.

An erect branching annual up to a meter tall, with panicles of yellow or brown, turgid spikelets about 2.5 mm. long.

A weed in fields and waste places at low altitudes, southern Florida and Texas to Ecuador and Brazil. Originally described from Jamaica.

ECUADOR: Milagro, *Hitchcock* 20215. El Recreo, *Eggers* 15418, 15834. Chanduy, *Spruce* 6422 (Kew Herb.).

4. Panicum ramosum L. Mant. 1: 29. 1767.

A spreading annual, with pubescent culms 20 to 30 cm. long, thin, flat, narrowly lanceolate, pubescent blades 3 to 5 mm. wide, and loose racemes 5 to 10 mm. long, somewhat distant on a villous axis 3 to 4 cm. long; spikelets about 2.5 mm. long, glabrous, rather obtuse, the rachis pilose, some of the hairs on the short pedicels as long as the spikelet; first glume rounded or truncate, 1 mm. long; second glume reticulate at apex; sterile lemma somewhat granular in texture; fertile floret transversely rugose.

Open ground, southern Asia. Originally described from a garden specimen from India. In America known only from the following specimen.

PERU: Along the railroad at San Bartolomé, *Weberbauer* 5283 (Field Mus.).

5. Panicum echinulatum Mez, Notizbl. Bot. Gart. Berlin 7: 62. 1917.

Panicum echinulatum var. *boliviense* Henr. Med. Rijks Herb. Leiden 40: 50. 1921. (*Herzog* 3004; differs in having wider blades.)

A spreading annual, with firm lanceolate blades and hispidulous spikelets in racemes arranged in a panicle.

Paraguay, whence originally described, and Bolivia; also the Virgin Islands. The specimen from St. Croix, Virgin Islands (*Eggers* in 1876) was cited by Hitchcock and Chase[37] under *Panicum adspersum*.

BOLIVIA: Villa Montes, *Pflanz* 607. Santa Cruz, patio of hotel, *Steinbach* 5259; *Herzog* 3004.

6. Panicum aquaticum Poir. in Lam. Encycl. Suppl. 4: 281. 1816.

A decumbent spreading glaucous perennial 50 to 100 cm. tall, with glabrous flat blades 5 to 10 mm. wide, and a spreading panicle of spikelets about 3 mm. long.

Wet places or in shallow water, Mexico to Paraguay. Originally described from Porto Rico.

PERU: Lima, *Wilkes Expl. Exped.; Didrichsen* (*Galathea Exped.*) 4394.

7. Panicum chloroticum Nees; Trin. Gram. Pan. 236. 1826.

Resembling *P. aquaticum*, but spikelets only about 2 mm. long.

Wet places, Brazil, whence originally described, to Bolivia.

BOLIVIA: Reyes, *Rusby* 1636; *White* 1209 in part.

8. Panicum elephantipes Nees, Agrost. Bras. 165. 1829.

Panicum firmum Areschoug, Svensk. Freg. Eugenies Resa 116. 1910; Repert. Nov. Sp. Fedde 10: 299. 1912. Not *P. firmum* Kunth, 1829. (*N. J. Andersson*, Guayaquil.)

A robust, somewhat succulent perennial the culms as much as 2 cm. thick and 1 to 2 meters tall or more, with long, decumbent or creeping, rooting base, the nodes black in drying; panicle large and open; spikelets narrow, acuminate, 4 to 5 mm. long, the first glume about one-fourth as long.

Ponds and shallow water, West Indies and southern Mexico to Argentina. Originally described from Brazil.

ECUADOR: Guayaquil, *Andersson* in 1852.

This specimen has not been examined and the species is admitted on the description.

9. Panicum cayennense Lam. Tabl. Encycl. 1: 173. 1791.

An erect annual 20 to 50 cm. tall, with papillose-pilose sheaths, linear pilose blades 4 to 10 mm. wide, and terminal and axillary panicles 8 to 20 cm. long, the obovoid glabrous spikelets about 2.3 mm. long.

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[37] Contr. U. S. Nat. Herb. 15: 43. 1910.

Open ground and pine woods, Cuba and Costa Rica to Brazil. Originally described from Cayenne, French Guiana.

BOLIVIA: Buena Vista, *Steinbach* 6935.

10. Panicum hirticaule Presl, Rel. Haenk. 1: 308. 1830.

An erect or spreading, usually reddish or brownish annual mostly less than 50 cm. tall, with hispid sheaths, and open panicles of glabrous acute spikelets about 3 mm. long, the first glume half or three-fourths the length of the spikelet.

Dry open ground, southwestern United States to Colombia and Bolivia. Originally described from Mexico.

PERU: Colonia Perené, *Hitchcock* 22115. Huánuco, *Macbride* 3526.

11. Panicum stramineum Hitchc. & Chase, Contr. U. S. Nat. Herb. **15**: 67. 1910.

Differing from *P. hirticaule* in the pale color, the somewhat larger spikelets, and the shorter, less acute first glume.

Open ground, Mexico to Bolivia. Originally described from Mexico.

ECUADOR: Between La Toma and Loja, *Hitchcock* 21402.

BOLIVIA: Reyes, *Cárdenas* (*Mulford Biol. Expl.*) 1647.

12. Panicum ghiesbreghtii Fourn. Mex. Pl. **2**: 29. 1886.

A stiff erect hirsute perennial, with elongate flat blades, and narrowly diffuse panicles.

Low moist ground, Mexico, whence originally described, to the West Indies, Ecuador, and Bolivia.

ECUADOR: El Recreo, *Eggers* 15419.

BOLIVIA: Buena Vista, *Steinbach* 6979.

13. Panicum quadriglume (Doell) Hitchc.

Panicum cayennense var. *quadriglume* Doell in Mart. Fl. Bras. **2**^{2}: 220. 1877.

An erect cespitose perennial 20 to 40 cm. tall, with hirsute sheaths, narrow erect pilose blades, and open panicles of pointed spikelets 3 mm. long; sterile lemmas 2, much exceeding the dark shining fruit.

Grassy plains, Brazil, whence originally described, to Bolivia and Paraguay.

BOLIVIA: Yungas, *Bang* 493. Mulluhuaya, *Buchtien* 4174. Buena Vista, *Steinbach* 5299.

14. Panicum hirsutum Swartz, Fl. Ind. Occ. 1: 173. 1797.

A stout erect perennial as much as 2 meters tall, with hirsute sheaths, flat glabrous blades as much as 2 cm. wide, and large, rather densely flowered panicles, the branches at first ascending, finally spreading; spikelets glabrous, acute, about 2 mm. long.

Open moist soil, West Indies and central Mexico to Ecuador. Originally described from Jamaica.

ECUADOR: Panigón Plantation, *Hitchcock* 20580, 20601.

15. Panicum maximum Jacq. Coll. Bot. 1: 76. 1786. GUINEA GRASS.

A tufted erect perennial as much as 2 meters tall, sometimes taller, with pubescent nodes, elongate flat blades, and a large open panicle of green oblong glabrous spikelets 3 mm. long.

A native of tropical Africa; introduced and spontaneous in the American Tropics at low altitudes; often cultivated. Originally described from Guadeloupe.

ECUADOR: Milagro, *Hitchcock* 20193. Puéllaro, *Mille* 310. Without locality, *Lehmann* 5745.

PERU: Piura, *Spruce* in 1865 (Kew Herb.).

BOLIVIA: Milluhuaya, *Buchtien* 4272. Coroico, *Buchtien* 3640.

16. **Panicum bulbosum** H. B. K. Nov. Gen. & Sp. **1**: 99. 1816.

Panicum avenaceum H. B. K. Nov. Gen. & Sp. **1**: 99. 1816. (Near Quito, *Bonpland.*)

Resembling *P. maximum* but the base of the culm enlarged into a hard corm as much as one-half inch in diameter, and the sheaths glabrous.

Moist places in canyons and valleys, southwestern United States to southern Mexico, whence originally described; also in Ecuador.

ECUADOR: Chillo, *Sodiro; Mille* 309.

17. **Panicum tricholaenoides** Steud. Syn. Pl. Glum. **1**: 68. 1854.

Panicum junceum Nees, Agrost. Bras. 159. 1829. Not *P. junceum* Trin. 1826.

A slender, erect, firm or woody perennial a meter or more tall, with stout creeping rhizome, smooth blue-green culm, and narrow panicle of pale turgid spikelets about 2 mm. long.

Moist ground, Brazil, whence originally described, to Bolivia and Argentina.

BOLIVIA: Reyes, *White* 1209. Dept. Santa Cruz, *Steinbach* 6900.

18. **Panicum polygonatum** Schrad. in Schult. Mant. **2**: 256. 1824.

Panicum ecuadorense Mez, Bot. Jahrb. Engler **56**: Beibl. **125**: 3. 1921. (*Eggers* 15064, Ecuador.)

Similar to *P. laxum;* nodes pubescent; blades more or less cordate at base; panicle more branching, the main branches mostly rebranched, the axis with occasional long hairs.

Swamps and moist ground, Mexico to Brazil and Peru. Originally described from Brazil.

ECUADOR: Bucay, *Rose* 24020. Teresita, *Hitchcock* 20424, 20433. Puente de Chimbo, *Sodiro* 305. Portovelo, *Hitchcock* 21256. La Chonta, *Rose* 23475.

PERU: Colonia Perené, *Hitchcock* 22059, 22124.

BOLIVIA: Milluhuaya, *Buchtien* 4170. Hacienda Simaco, *Buchtien* 5334. Hacienda Casana, *Buchtien* 7129. Chulumani, *Hitchcock* 22712. Huachi, *White* 961. Buena Vista, *Steinbach* 5231. Río Surutú, *Steinbach* 6840.

19. **Panicum pilosum** Swartz, Prodr. Veg. Ind. Occ. 22. 1788.

Setaria disticha H. B. K. Nov. Gen. & Sp. **1**: 112. 1816.

Spreading or ascending; panicles 5 to 15 cm. long, the numerous dense racemes 1 to 3 cm. long, rather closely arranged along the main axis, the rachises stiffly ciliate; spikelets glabrous, 1.5 mm. long.

Moist ground and open woods, Mexico and the West Indies to Brazil and Ecuador. Originally described from Jamaica.

ECUADOR: Teresita, *Hitchcock* 20467.

BOLIVIA: Mapiri, *Rusby* 212; *Buchtien* 1183. Rurrenabaque, *Rusby* 759. San Buena Ventura, *Cárdenas* (*Mulford Biol. Expl.*) 1772.

20. **Panicum laxum** Swartz, Prodr. Veg. Ind. Occ. 23. 1788.

Vilfa gavana Steud.; Lechl. Berb. Amer. Austr. 56. 1857, name only. (*Lechler* 2285).

Plants more or less spreading or decumbent at base, usually 40 to 60 cm. tall, sometimes taller; panicle open, the spikelets along one side of the spreading main branches; spikelets a little more than 1 mm. long.

Ditches and moist open ground, common, Mexico and the West Indies to Bolivia and Paraguay. Originally described from Jamaica.

ECUADOR: Milagro, *Hitchcock* 20257. Balao, *Eggers* 14585. Cashurco, *Hitchcock* 21799, 21867, 21879. Napo River, *Jameson* 746 (Kew Herb.).

PERU: Colonia Perené, *Hitchcock* 22064, 22099. San Gaván, *Lechler* 2285.

BOLIVIA: Reyes, *Rusby* 1658½. Mapiri, *Rusby* 228, 236. Unduavi, *Rusby* 22. Yungas, *Bang* 266, 308a. Coroico, *Buchtien* 6441. Hacienda Simaco, *Buchtien* 5315. Hacienda Casana, *Buchtien* 7122, 7127. La Florida, *Hitchcock* 22626. Chulumani, *Hitchcock* 22667, 22668. Between Río Piray and Río Cuchi, *Herzog* 1444. Buena Vista, *Steinbach* 5161, 5338, 6850.

21. Panicum boliviense Hack. Repert. Nov. Sp. Fedde **11**: 19. 1912.

Resembling *P. laxum*, but blades broader, lanceolate or oblong-lanceolate, mostly less than 10 cm. long, as much as 1.5 cm. wide, scarcely narrowed at the cordate and slightly petioled base, the panicle more open and loosely flowered.

Moist places, southern Mexico to Bolivia, whence originally described. (Type, *Buchtien* 2501.)

ECUADOR: El Recreo, *Eggers* 15701 in part.

BOLIVIA: Antahuacana, *Buchtien* 2501. Buena Vista, *Steinbach* 6857.

22. Panicum stoloniferum Poir. in Lam. Encycl. Suppl. **4**: 274. 1816.

A creeping, freely branching perennial, with ascending flowering branches 10 to 30 cm. tall, lanceolate blades 3 to 15 mm. wide, panicles 1 to 5 cm. long, several spreading racemes 5 to 10 mm. long, and glabrous spikelets 2.5 mm. long.

Woods and low ground, Guatemala to Brazil and Bolivia. Originally described from French Guiana.

ECUADOR: Balao, *Eggers* 14149.

PERU: Colonia Perené, *Hitchcock* 22057.

BOLIVIA: Mapiri, *Buchtien* 1167.

23. Panicum frondescens Meyer, Prim. Fl. Esseq. 56. 1818.

Culms ascending from a decumbent or creeping base, 30 to 50 cm. tall, the lanceolate blades 12 to 30 mm. wide; racemes numerous and crowded, the lower as much as 25 mm. long; spikelets glabrous, 2.5 to 2.8 mm. long.

Moist ground, Mexico to Brazil and Bolivia. Originally described from British Guiana.

ECUADOR: Guayaquil, *Holmgren* 86. Naranjal, *Lehmann* 5746 (Kew Herb.).

PERU: Colonia Perené, *Hitchcock* 22058. La Merced, *Macbride* 5646. Tarapoto, *Spruce* 4192 (Kew Herb.).

BOLIVIA: Lake Rogagua, *Cárdenas* (*Mulford Biol. Expl.*) 1704. Mapiri, *Rusby* 228, 229; *Buchtien* 1172, 1173. Coroico, *Buchtien* 1173a. Antahuacana, *Buchtien* 2502. Hacienda Casana, *Buchtien* 7120. Buena Vista, *Steinbach* 5130, 6855.

24. Panicum pulchellum Raddi, Agrost. Bras. 42. 1823.

A delicate creeping rooting perennial, with ascending flowering branches 20 to 30 cm. tall, thin ovate-lanceolate blades, and oblong panicles of small spikelets, the sterile lemma with a pair of small glands.

Woods and savannas, Mexico to Brazil and Bolivia. Originally described from Brazil.

ECUADOR: Teresita, *Hitchcock* 20536. Between La Chorita and Portovelo, *Hitchcock* 21212. Bucay, *Rose* 22446.

PERU: San Gaván, *Lechler* 2180 (Kew Herb.).

BOLIVIA: Guanay, *Rusby* 217.

25. Panicum schiffneri Hack. Ergeb. Bot. Exped. Akad. Wiss. Südbras. 11. 1906.

A slender branching straggling perennial, with culms a meter long, lanceolate blades 1.5 cm. wide, and open panicles 15 cm. long, with a few distant

branches, the spikelets 2 mm. long, clustered along the main branches, the first glume very small.

Copses and brush land, Mexico and the West Indies to Ecuador and Brazil. Originally described from southern Brazil.

ECUADOR: Teresita, *Hitchcock* 20535. Between Huigra and Naranjapata, *Hitchcock* 20672.

26. Panicum trichoides Swartz, Prodr. Veg. Ind. Occ. 24. 1788.

A branching annual 20 to 40 cm. tall, with thin lanceolate acuminate blades 1 to 2 cm. wide, delicate open panicles 5 to 20 cm. long, and long-pediceled, sparsely hirsute spikelets a little more than 1 mm. long.

Woods and open ground, often a weed in cultivated soil, Mexico and the West Indies to Brazil and Ecuador. Originally described from Jamaica.

ECUADOR: Guayaquil, *Anthony & Tate* 50; *Hitchcock* 19947, 19969. Balao, *Eggers* 14481. El Recreo, *Eggers* 15417. Milagro, *Hitchcock* 20213. Napo River, *Jameson* 745 (Kew. Herb.). Portovelo, *Rose* 23449.

PERU: Colonia Perené, *Hitchcock* 22101.

27. Panicum trichanthum Nees, Agrost. Bras. 210. 1829.

Panicum guayaquilense Steud. Syn. Pl. Glum. 1: 85. 1854. (*Jameson* 560.)

A branching straggling perennial, with slender culms as much as 1 meter long, lanceolate blades as much as 2 cm. wide, and diffuse panicles of minute spikelets about 1.3 mm. long.

Thickets and river banks, Mexico to Peru and Paraguay. Originally described from Brazil.

ECUADOR: Tenguel, *Holmgren* 113. Milagro, *Hitchcock* 20214, 20294. Guayaquil, *Jameson* 560 (Kew Herb.).

PERU: Colonia Perené, *Hitchcock* 22055. La Merced, *Macbride* 5309.

BOLIVIA: Chulumani, *Hitchcock* 22660. Coroico, *Buchtien* 446 (Kew Herb.), 3612.

28. Panicum glutinosum Swartz, Prodr. Veg. Ind. Occ. 24. 1788.

Panicum divergens H. B. K. Nov. Gen. & Sp. 1: 102. 1816. (Near Quito. *Bonpland.*)

Culms 1 to 2 meters tall from a decumbent base; blades elongate, 1.5 to 2.5 cm. wide; panicle 15 to 30 cm. long, open, the spikelets viscid, 3 mm. long, the first glume about as long as the second.

Mountain woods, Mexico and the West Indies to Bolivia and Paraguay. Originally described from Jamaica.

ECUADOR: Between Portovelo and El Tambo, *Hitchcock* 21300.

PERU: Hacienda Pampayacu, *Macbride* 5101. Casapí, *Mathews* 2104 (Kew Herb.).

BOLIVIA: Hacienda Simaco, *Buchtien* 5316. Mapiri, *Rusby* 244.

The type specimen of *Panicum divergens* consists of two species. One is *P. glutinosum*, from which the major part of the description is drawn. The other appears to be *P. stigmosum*, from which the description of the spikelet is drawn.

29. Panicum sellowii Nees, Agrost. Bras. 153. 1829.

Plants perennial, spreading; culms as much as 1 meter tall; blades thin, as much as 15 cm. long and 3 cm. wide, pubescent or glabrate; panicle loose and open, rather few-flowered; spikelets a little more than 2 mm. long, glabrous or nearly so, or (in the Ecuador specimens) pubescent, short-pediceled along the outer part of the main branches.

Damp woods, Cuba and Mexico to Brazil. Originally described from Brazil.

ECUADOR: Between Portovelo and El Tambo, *Hitchcock* 21309. Portovelo, *Rose* 23402.

PERU: San Gaván, *Lechler* 2430 (Kew Herb.).

BOLIVIA: Chulumani, *Hitchcock* 22697. La Florida, *Hitchcock* 22638. Bella Vista, *Hitchcock* 22752 (spikelets sparsely hispidulous). Yanacachi, *Buchtien* 429. Hacienda Simaco, *Buchtien* 5317. Hacienda Casana, *Buchtien* 7114.

30. Panicum obtusiglume Hitchc., sp. nov.

Perennial; culms cespitose, slender, decumbent at base, glabrous, 10 to 15 cm. tall; sheaths pilose with ascending or appressed hairs; ligule a very short glabrous membrane less than 0.5 mm. long; blades mostly appressed, densely pilose on both surfaces with spreading hairs, oblong-lanceolate, scarcely narrowed at the base, 10 to 15 mm. long, about 2 mm. wide; panicles exserted, spreading, few-flowered, 2 to 3 cm. long, about as wide, the branches once or twice divided, somewhat flexuous, the ultimate branchlets or pedicels very slender, 4 to 8 mm. long, glabrous, the axillary pulvini bearing a few slender hairs; spikelets globose or oval, pilose, 1.5 mm. long; first glume about three-fourths as long as the spikelet, obtuse; second glume and sterile lemma slightly exceeding the fruit, obtuse; fertile lemma somewhat apiculate.

Type in the U. S. National Herbarium, no. 1,126,951, collected at Tambillo, Peru, March 18, 1878, by C. de Jelski (no. 403).

The species is allied to *Panicum parvifolium*, from which it differs in the short culms, pubescent foliage, and pilose spikelets. In habit the specimen differs in being densely cespitose, but this may not be constant.

31. Panicum parvifolium Lam. Tabl. Encycl. **1**: 173. 1791.

Panicum brasiliense Spreng. Syst. Veg. **1**: 321. 1825.

A slender straggling branching perennial, with culms 10 to 30 cm. tall, oblong-lanceolate blades mostly 1 to 2 cm. long and 3 to 5 mm. wide, ovoid panicles 2 to 4 cm. long, and elliptic glabrous spikelets about 1.5 mm. long, the first glume more than half as long as the spikelet. Our specimens have pubescent blades like the type of *Panicum brasiliense*.

Savannas and moist places. Central America and the West Indies to Paraguay. Originally described from tropical America.

BOLIVIA: Buena Vista, *Steinbach* 6646, 6865, 7001.

32. Panicum caaguazuense Henr. Med. Rijks Herb. Leiden **47**: 2. 1922.

A slender branching smooth perennial, with decumbent culms 40 to 60 cm. tall, sessile, erect, rather rigid, acuminate blades, mostly less than 10 cm. long, and a diffuse panicle of smooth oval spikelets about 2 mm. long.

Savannas, Brazil to Paraguay. Originally described from Paraguay.

BOLIVIA: Buena Vista, *Steinbach* 5175. Doubtfully referred, ex description.

33. Panicum rudgei Roem. & Schult. Syst. Veg. **2**: 444. 1817.

A tufted tawny perennial, with robust, ascending, often zigzag culms as much as 1 meter tall, hirsute sheaths, linear blades, terminal and axillary, open, divaricately spreading panicles, and turgid, abruptly pointed, glabrous or sparsely hispid spikelets 3.5 mm. long.

Savannas and open ground, British Honduras and Jamaica to Brazil. Originally described from British Guiana.

PERU: "In Peruviae Andium," *Ruiz* (fragment from Berlin Herbarium).

BOLIVIA: Mapiri, *Buchtien* 1159.

34. Panicum urvilleanum Kunth, Rév. Gram. **2**: 403. *pl. 115*. 1830.

Panicum megastachyum Presl, Rel. Haenk. **1**: 305. 1830. (Peru.) Not *P. megastachyum* Nees, 1826.

Panicum preslii Kunth, Enum. Pl. **1**: 121. 1833.

A robust perennial from strong creeping rhizomes, with villous sheaths and somewhat open panicles with ascending branches and large silky-villous spikelets 6 to 7 mm. long.

Sandy deserts, southwestern United States; Argentina and Chile. Originally described from Chile.

PERU: Mountains of Huánuco, *Haenke.*

Since no collections from Peru are known except the one made by Haenke, the locality is recorded with doubt. It is known that there are many errors in the records of Haenke's collections, and this specimen may have come from Chile, where Haenke also collected.

A sterile specimen from southern Ecuador may belong to this species (between La Toma and Loja, *Hitchcock* 21397).

35. Panicum hebotes Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. **1**: 301. 1834.

A slender smooth straggling perennial, with lanceolate blades about 1.5 cm. wide and diffuse panicles of glabrous spikelets about 2 mm. long.

Moist thickets, Brazil to Ecuador and Bolivia. Originally described from Brazil.

ECUADOR: Cashurco, *Hitchcock* 21862.

BOLIVIA: Yungas, *Bang* 493.

36. Panicum sciurotis Trin. Gram. Pan. 228. 1826.

A slender cespitose perennial, mostly 20 to 40 cm. tall, sometimes 60 cm., finally bearing divaricate branches, the blades softly and finely pubescent, somewhat cordate-clasping, lanceolate, 5 to 15 mm. wide, the panicle open and spreading, mostly 5 to 8 cm. long, the spikelets elliptic, about 2 mm. long.

Shady banks, Brazil, whence originally described, to Ecuador and Bolivia.

ECUADOR: Between La Chorita and Portovelo, *Hitchcock* 21191, 21211, 21211½. Between Portovelo and El Tambo, *Hitchcock* 21302. Cashurco, *Hitchcock* 21809. Baños, *Pachano* 228.

BOLIVIA: Hacienda Simaco, *Buchtien* 5319. Hacienda Casana, *Buchtien* 7115, 7116. Yanacachi, *Buchtien* 414. Chulumani, *Hitchcock* 22669, 22709. San José, *Hitchcock* 22738.

37. Panicum stigmosum Trin. Gram. Pan. 194. 1826.

Resembling *P. sciurotis*, but less slender, the blades glabrous, the panicle branches narrowly ascending, and the spikelets about 3 mm. long.

Shady slopes, Brazil, whence originally described, to Ecuador.

ECUADOR: Between La Toma and Loja, *Hitchcock* 21420.

38. Panicum pantrichum Hack. Verh. Zool. Bot. Ges. Wien **1915**: 72. March, 1915.

Panicum chiriquiense Hitchc. & Chase, Contr. U. S. Nat. Herb. **17**: 527. July, 1915.

Panicum protractum Mez, Notizbl. Bot. Gart. Berlin **7**: 77. 1917.

A slender branching spreading perennial, rooting at the lower nodes, with pubescent sheaths, narrowly lanceolate, puberulent blades, and open panicles, the glabrous or pubescent, oval spikelets about 2 mm. long, crowded along the upper part of the branchlets.

Shady places, Panama to Brazil and Bolivia. Originally described from Brazil.

ECUADOR: Between La Chorita and Portovelo, *Hitchcock* 21200.

BOLIVIA: Mapiri, *Buchtien* 1171.

39. Panicum polycladum Ekman, Ark. för Bot. **11**[4]: 24. 1912.

A slender straggling branching perennial, with narrowly lanceolate blades as much as 1 cm. wide on the main culm, reduced on the branches, the panicles open, elliptic, the spikelets glabrous, acute, about 2.5 mm. long.

Thickets, southern Ecuador to northern Argentina. Originally described from Misiones, Argentina.

ECUADOR: Between Portovelo and El Tambo, *Hitchcock* 21316.

40. Panicum cordovense Fourn. Mex. Pl. **2**: 26. 1886.

A slender branching straggling perennial, with narrowly lanceolate, glabrous blades, mostly less than 10 cm. long, and panicles 10 to 15 cm. long, those on the branches reduced, the spikelets glabrous, about 3 mm. long, somewhat appressed on the branchlets.

Thickets and shady places, Mexico to Bolivia. Originally described from Mexico.

BOLIVIA: Hacienda Simaco, *Buchtien* 5317 in part. La Florida, *Hitchcock* 22614, 22621, 22647. San José, *Hitchcock* 22732.

41. Panicum versicolor Doell in Mart. Fl. Bras. **2**[2]: 254. 1877.

Panicum truncatum Nees, Agrost. Bras. 215. 1829. Not *P. truncatum* Trin. 1826.

An erect perennial, with short rhizomes, slender culms 30 to 60 cm. tall, pubescent or nearly glabrous blades 3 to 6 mm. wide, and ovoid or oblong panicles 2 to 8 cm. long, the spikelets asymmetric, about 2.5 mm. long, glabrous; glumes subequal, obtuse, about one-third as long as the spikelet; sterile floret staminate, as long as the fertile one, the gibbous palea as long as the lemma, enlarged and winged in fruit, finally splitting; fertile floret somewhat keeled and compressed laterally, gibbous, at maturity dark brown, shining.

Grassy plains, Brazil, whence originally described, to Colombia and Paraguay.

BOLIVIA: Buena Vista, *Steinbach* 6643, 6656.

42. Panicum zizanioides H. B. K. Nov. Gen. & Sp. **1**: 100. 1816.

Panicum oryzoides Swartz, Prodr. Veg. Ind. Occ. 23. 1788. Not *P. oryzoides* Ard. 1764.

Acroceras oryzoides Stapf in Prain, Fl. Trop. Afr. **9**: 622. 1920.

Plants branched, decumbent and rooting at base, forming a tangle; fertile culms 30 to 60 cm. tall, sometimes taller; blades cordate-clasping, 5 to 15 cm. long, usually 1 to 2 cm. wide; panicle of a few ascending distant branches with short branchlets and appressed glabrous pointed spikelets 5.5 to 6 mm. long, the first glume nearly as long as the spikelet; fertile lemma with a little appendage or crest at the apex.

Moist places, tropical regions of both hemispheres; in South America, Colombia to Brazil and Argentina. Originally described from Colombia.

PERU: Yurimaguas, *Pöppig* 2880 in 1831.

43. Panicum paucispicatum Morong, Ann. N. Y. Acad. **7**: 262. 1893.

A coarse straggling branching perennial, with velvety oblong-lanceolate blades and narrow panicles with few rather distant, appressed branches, the velvety fusiform acute spikelets about 7 mm. long, short-pediceled and appressed to the branches.

Sandy thickets, Paraguay, whence originally described, and Bolivia.

BOLIVIA: Palmar, *Herzog* 1524.

44. Panicum hirtum Lam. Encycl. **4**: 741. 1798.

A delicate annual 20 to 30 cm. tall, with ovate-lanceolate clasping blades, and open panicles of pubescent spikelets about 1.5 mm. long, set obliquely on the pedicels.

Shady places, Trinidad to Brazil and Ecuador. Originally described from French Guiana.

ECUADOR: Portovelo, *Hitchcock* 21253. Between Portovelo and El Tambo, *Hitchcock* 21320.

45. Panicum megiston Schult. Mant. **2**: 248. 1824.

A tall robust perennial, with long creeping base, the flowering culms 1 to 2 meters tall; panicle 40 to 60 cm. long, open, the stiff main branches in distant verticils; spikelets globular-ovoid, abruptly pointed, about 3.5 mm. long, glabrous, the first glume scarcely one-third as long as the spikelet.

Swamps and moist ground, Mexico and Cuba to Ecuador and Paraguay. Originally described from British Guiana.

ECUADOR: Milagro, *Hitchcock* 20283. Panigón Plantation, *Hitchcock* 20571. Balao, *Eggers* 14345; *Jameson* 568 (Kew Herb.). Naranjal, *Mille* 13.

BOLIVIA: Ixiamas, *White* 1135.

46. Panicum olyroides H. B. K. Nov. Gen. & Sp. **1**: 102. 1816.

Plants perennial, stiffly erect, 50 to 100 cm. tall, the sheaths overlapping, the blades firm; panicle large and open, 20 to 30 cm. long, the numerous stiff slender branches naked below; spikelets rather few, large, on slender pedicels toward the ends of the branches, fusiform, acuminate, 6 to 7 mm. long.

Savannas, Venezuela to Brazil. Originally described from Venezuela.

BOLIVIA: Between Río Piray and Río Cuchi, *Herzog* 1445. Buena Vista, *Steinbach* 5378, 6978.

47. Panicum procurrens Nees; Trin. Gram. Pan. 183. 1826.

A decumbent spreading branching perennial, with glabrous or pubescent, narrowly lanceolate, white-margined blades and rather small, pale panicles with ascending branches, the pilose spikelets about 4 mm. long, somewhat appressed along the upper part of the branches.

Plains, Brazil, whence originally described, to Bolivia and Argentina.

BOLIVIA: Ixinmas, *Cárdenas* (*Mulford Biol. Expl.*) 1909. Buena Vista, *Steinbach* 5339, 7012.

The following species of *Panicum* described from our range have not been identified:

PANICUM (Anthaenantia) GIGANTEUM Kuntze, Rev. Gen. Pl. **3**²: 360. 1898. Not *P. giganteum* Scheele, 1849. Rio Juntas, Bolivia. The description suggests *P. tricholaenoides*.

PANICUM LANUGINOSUM Presl, Rel. Haenk. **1**: 306. 1830. (Peru.) Not *P. lanuginosum* Ell. 1816. *Panicum mollicomum* Kunth, Rév. Gram. **1**: Suppl. IX. 1830.

PANICUM PAVONI Mez, Bot. Jahrb. Engler **56**: Beibl. **125**: 5. 1921. "Peru (Pavon)." This may not be a species of *Panicum*.

PANICUM QUETAMEENSE Mez, Notizbl. Bot. Gart. Berlin **7**: 75. 1917. This species is described from "Ecuador: ad Quetame in declivitatibus orientalibus Andium Bogotensium (Andrè n. 3210)." Quetame is in Colombia instead of Ecuador, hence not within our range.

96. ICHNANTHUS Beauv.

Inflorescence and spikelets as in *Panicum*, the first glume often nearly as long as the spikelet, the fruit acute or subacute, the margins of the lemma usually flat, the rachilla produced below the lemma into a minute stipe, this bearing on either side membranaceous appendages adnate to the base of the lemma and free above, the appendages often wanting and indicated by minute excavations only.

Appendages of fertile lemma developed.
Blades 4 to 7 cm. wide; spikelets 7 mm. long; wings large---1. I. panicoides.
Blades 1 to 2 cm. wide; spikelets 3 to 5 mm. wide; wings small.
Spikelets 3 mm. long, obtuse---2. I. calvescens.
Spikelets 4 to 5 mm. long, acute---3. I. peruvianus.
Appendages of fertile lemma reduced to scars.
Culms erect, as much as 5 meters tall---4. I. breviscrobs.
Culms spreading and straggling, much branched, less than 2 meters long.
Blades ovate, rather firm, scabrous on upper surface---7. I. axillaris.
Blades lanceolate or linear-lanceolate, rather thin.
Inflorescence paniculate; spikelets glabrous to sparsely pilose.
Panicles terminal and axillary, mostly less than 10 cm. long.
Spikelets glabrous or occasionally with a few hairs along the margins of the glumes---5. I. pallens.
Spikelets sparsely pilose---6. I. candicans.
Panicles terminal only, 10–20 cm. long, the racemes numerous and close together---8. I. ruprechtii.
Infloresence of several dense racemes on the main axis; spikelets with long, stiff hairs toward the summit---9. I. minarum.

1. Ichnanthus panicoides Beauv. Ess. Agrost. 57. *pl. 12 f. 1.* 1812.

Culms solitary or few in a cluster, erect or ascending, the lower part naked, the lower sheaths distant, bladeless, the upper overlapping; blades elliptic, rather thick and firm, 4 to 7 cm. wide, 2 to 3 times as long; panicle few-flowered, the spikelets about 7 mm. long.

Floor of virgin forest, Guiana to Peru and Brazil. Originally described from tropical America.

PERU: San Gavân, *Lechler* 2675 (Kew Herb.).

2. Ichnanthus calvescens (Nees) Doell in Mart. Fl. Bras. **2**[2]: 285. 1877.

Panicum calvescens **Nees; Trin. Gram. Pan. 193. 1826.**

A decumbent branching perennial 0.5 to 1 meter tall, with densely villous to glabrate sheaths, lanceolate, falcate, usually velvety blades 1 to 2 cm. wide, and narrow open many-flowered panicles 10 to 20 cm. long, the branches ascending, the glabrous spikelets 3 mm. long.

Rocky cliffs and shrubby slopes, Brazil, whence originally described, to Peru and Bolivia.

PERU: Colonia Perené, *Hitchcock* 22128. La Merced, *Macbride* 5535.

BOLIVIA: Milluhuaya, *Buchtien* 737, 4264. Chulumani, *Hitchcock* 22653, 22699.

3. Ichnanthus peruvianus Mez, Repert. Nov. Sp. Fedde **15:** 129. 1918.

A spreading branching perennial, as much as a meter tall, with more or less villous sheaths, narrowly lanceolate blades 1 to 1.5 cm. wide, scaberulous above and velvety beneath, and spreading panicles 10 to 20 cm. long, the spikelets glabrous, about 4 to 5 mm. long, the second glume and sterile lemma blunt.

Shrubby banks, Peru and Bolivia. Originally described from Peru. (Type, *Weberbauer* 1131.)

PERU: Sandía, *Weberbauer* 1131.

BOLIVIA: Hacienda Casana, *Buchtien* 7123. Coroico, *Hitchcock* 22715. San José, *Hitchcock* 22741.

4. **Ichnanthus breviscrobs** Doell in Mart. Fl. Bras. 2²: 294. 1877.
Panicum magnum Hitchc. Contr. U. S. Nat. Herb. 22: 489, 1922.

An erect, glabrous, rather stout, somewhat branched perennial as much as 5 meters tall, with lanceolate blades 2 to 4 cm. wide, and rather open panicles 10 to 30 cm. long, the glabrous spikelets 4 mm. long; wings wanting, the scars short. The sheaths bear a pair of firm auricles.

Open places in forests, Brazil to Bolivia and British Guiana. Originally described from Brazil.

BOLIVIA: Mapiri, *Buchtien* 1156.

Ichnanthus breviscrobs is based on two specimens, Santarem, *Spruce* 385, and Surinam, *Wullschlaegel* 1148. Since *Panicum magnum* was described, Mrs. Chase has examined the Wullschlaegel collection in the Brussels Herbarium. It proves to be the same as the type of *Panicum magnum* from British Guiana. For the present the species is retained, with some doubt, in *Ichnanthus*, following Doell, thus avoiding a new name until the group as represented in Brazil can be revised.

5. **Ichnanthus pallens** (Swartz) Munro; Benth. Fl. Hongk. 414. 1861.
Panicum pallens Swartz, Prodr. Veg. Ind. Occ. 23. 1788.

Creeping and freely branching, the culms ascending, the flat blades lanceolate, asymmetric, 1 to 2 cm. wide, glabrous; panicles with several ascending branches, terminal and axillary; spikelets 3 to 4 mm. long, glabrous.

Rich woods and shady banks, tropics of the Western Hemisphere. Originally described from Jamaica.

ECUADOR: Milagro, *Hitchcock* 20224. Teresita, *Hitchcock* 20445, 20446. Cashurco, *Hitchcock* 21858, 21871, 21878. Between La Chorita and Portovelo, *Hitchcock* 21213. Cerro Manglar Alto, *Tate* 28. San José, *André* 3259 (Kew Herb.). Balao, *Jameson* 356 (Kew Herb.). La Chonta, *Rose* 23469.

PERU: Colonia Perené, *Hitchcock* 22067. San Gaván, *Lechler* 2187. (Kew Herb.).

BOLIVIA: Hacienda Simaco, *Buchtien* 5322. La Florida, *Hitchcock* 22610, 22620, 22631, 22641. Antahuacana, *Buchtien* 2498.

6. **Ichnanthus candicans** (Nees) Doell in Mart. Fl. Bras. 2²: 291. 1877.
Panicum candicans Nees, Agrost. Bras. 133. 1829.
Panicum maynense Trin. Linnaea 10: 298. 1836. (Tocache, Peru, *Pöppig.*)

A creeping branching perennial with the habit of *I. pallens*, the sheaths and blades villous, the glumes sparsely pilose, acuminate into a terete point (caudate). The blades average smaller and the spikelets narrower than in *I. pallens*.

Rocky cliffs and wet banks, Brazil, whence originally described, to Ecuador and Bolivia.

ECUADOR: Between Santa Rosa and La Chorita, *Hitchcock* 21136. Between La Chorita and Portovelo, *Hitchcock* 21199. Between Portovelo and El Tambo, *Hitchcock* 21303. Andes of Quito, *Jameson* 692 (Kew Herb.).

PERU: Colonia Perené, *Hitchcock* 22069.

BOLIVIA: Hacienda Simaco, *Buchtien* 5321. Chulumani, *Hitchcock* 22670. San José, *Hitchcock* 22739. Antahuacana, *Buchtien* 2497.

7. Ichnanthus axillaris (Nees) Hitchc. & Chase, Contr. U. S. Nat Herb. **18**: 334. 1917.

Panicum axillare Nees, Agrost. Bras. 141. 1829.

Similar to *I. pallens*, but the blades wider in proportion to the length, usually scabrous on the upper surface, and the spikelets sometimes sparsely hispid.

In open ground the plants may be robust, as much as a meter tall. On the forest floor the plants may be prostrate and matlike with rounded inflorescence.

Moist, more or less shaded slopes, Santo Domingo to Ecuador and Brazil. Originally described from Brazil.

ECUADOR: Balao, *Eggers* 14655. Teresita, *Hitchcock* 20425, 20468. Between La Chorita and Portovelo, *Hitchcock* 21202.

PERU: Hacienda Pampayacu, *Macbride* 5027.

8. Ichnanthus ruprechtii Doell in Mart. Fl. Bras. **2**^{2}: 293. 1877.

A spreading, branching, glabrous or sparsely pilose perennial 1 to 2 meters long, with lanceolate blades about 1.5 cm. wide, and rather dense, many-flowered panicles 10 to 20 cm. long, the spikelets glabrous, 3 mm. long.

Shady banks, Brazil, whence originally described, to Bolivia.

BOLIVIA: Hacienda Simaco, *Buchtien* 5236, 5237, 5336, 5337. Hacienda Casana, *Buchtien* 7124.

9. Ichnanthus minarum (Nees) Doell in Mart. Fl. Bras. **2**^{2}: 294. 1877.

Oplismenus minarum Nees, Agrost. Bras. 268. 1829.

Oplismenus secundus Presl, Rel. Haenk. **1**: 322. 1830. (Peru.)

Panicum secundum Steud. Nom. Bot. ed. 2. **2**: 263. 1842.

Panicum sandiense Mez, Bot. Jahrb. Engler **56**: Beibl. **125**: 5. 1921. (*Weberbauer* 545.)

A branching straggling glabrous perennial, with lanceolate blades 1 to 2 cm. wide, and a narrow inflorescence 3 to 10 cm. long of 3 to several ascending racemes 1 to 2 cm. long, the spikelets crowded; glumes conspicuously long-hirsute toward the apex, the first the longer, caudate.

Rocky cliffs and shady banks, Brazil, whence originally described, to Peru and Bolivia.

PERU: Between Tarma and La Merced, *Hitchcock* 22153. Piedra Grande, *Macbride* 3670, 3682. Sandía, *Weberbauer* 545.

BOLIVIA: La Florida, *Hitchcock* 22619. Milluhuaya, *Buchtien* 736, 4262, 4263. Coripata, *Hitchcock* 22695. Coroico, *Hitchcock* 22713; *Holway* 736. Valle Grande, *Herzog* 1817. Sorata, *Mandon* 1256; *Holway* 541.

ICHNANTHUS WEBERBAUERI Mez, Repert. Nov. Sp. Fedde **15**: 127. 1918. Described from Chunchusmayo (Huirchusmayo), Prov. Sandía, Peru, the type being *Weberbauer* 1236. The fruit is said to have large appendages and the blades are said to be narrowly lanceolate, 40 cm. long and 4 cm. wide; spikelets 5 mm. long. This collection has not been examined.

97. LASIACIS (Griseb.) Hitchc.

(*Panicum* Sect. *Lasiacis* Griseb.)

Inflorescence of open (rarely compact) panicles terminating the culm and leafy branches; spikelets subglobose, placed obliquely on their pedicels; glumes and sterile lemma broad, papery, shining, glabrous, commonly lanate at the apex; fruit white, bony-indurate, obovoid, both lemma and palea bearing at

the apex, in a slight crateriform excavation, a tuft of woolly hairs, the palea concave below, gibbous above, the apex often free at maturity; woody-stemmed clambering (rarely crawling) perennials.

Ligule noticeable, brown, about 2 mm. long.

Blades scabrous on both surfaces, otherwise glabrous, elongate, more than 10 times as long as wide ..... 1. L. oaxacensis.

Blades puberulent beneath, glabrous above, less than 10 times as long as wide. 2. L. ligulata.

Ligule inconspicuous, hidden by the mouth of the sheath (sometimes as much as 1 mm. long).

Blades glabrous on both surfaces. Panicles few-flowered, 5 to 10 cm. long. 3. L. divaricata.

Blades pubescent on one or both surfaces.

Blades narrowly lanceolate, averaging 8 to 10 times as long as wide; panicle large and open ..... 4. L. sorghoidea.

Blades ovate-lanceolate, usually 3 to 5 times as long as wide; panicle usually compact, rather narrow ..... 5. L. ruscifolia.

1. **Lasiacis oaxacensis** (Steud.) Hitchc. Proc. Biol. Soc. Washington **24**: 145. 1911.

Panicum oaxacense Steud. Syn. Pl. Glum. **1**: 73. 1854.

Slender, straggling, decumbent and geniculate at base, with numerous prop roots, the long branches ascending and arcuate, with narrow scabrous blades commonly 20 cm. long, and large open few-flowered panicles, the spikelets borne at the ends of the branchlets.

Edges of woods, western Jamaica and Mexico, whence originally described, to Ecuador.

ECUADOR: El Recreo, *Eggers* 15572. Milagro, *Hitchcock* 20299. Panigón Plantation, *Hitchcock* 20568. Teresita, *Hitchcock* 20437. Cashurco, *Hitchcock* 21894. Between Santa Rosa and La Chorita, *Hitchcock* 21131. Venturo, *Rose* 23525.

2. **Lasiacis ligulata** Hitchc. & Chase, Contr. U. S. Nat. Herb. **18**: 337. 1917.

Panicum megacarpum Steud.; Lechl. Berb. Amer. Austr. 56. 1857, name only. (*Lechler* 2219.)

Plants branched, woody, clambering to the height of 5 to 10 meters; ligule 1 to 2 mm. long; blades narrowly lanceolate, 6 to 12 cm. long, narrowed at base, puberulent beneath; panicles 5 to 10 cm. long, the spikelets obovoid, 4 mm. long, black and hard at maturity.

Copses and open forest, Guatemala to Brazil and Bolivia. Originally described from Trinidad.

ECUADOR: Teresita, *Hitchcock* 20438. Huigra, *Hitchcock* 20523, 20744, 20754. Cashurco, *Hitchcock* 21856, 21863. Gualea, *Sodiro* in 1888. Mount Pichincha, *Jameson* 200 (Kew Herb.).

PERU: Colonia Perené, *Hitchcock* 22116. La Merced, *Macbride* 5302. San Govân, *Lechler* 2219. Río Huallaga Canyon, below Río Santo Domingo, *Macbride* 4250. Without locality, *Jelski* 583.

BOLIVIA: La Florida, *Hitchcock* 22616. Yungas, *Bang* 494. Huachi, *White* 1004. Antahuacana, *Buchtien* 2499.

Two specimens (*Hitchcock* 20744, 20754) have larger spikelets, 5 mm. long; two specimens (*Hitchcock* 20438, 20523) have ligules 4 mm. long. More material may show these to represent different species.

3. Lasiacis divaricata (L.) Hitchc. Contr. U. S. Nat. Herb. **15**: 16. 1910.

Panicum divaricatum L. Syst. Nat. ed. 10. **2**: 871. 1759.

Shrubby, with strong canes, clambering to a height of 3 or 4 meters, the main branches often fascicled, the vigorous secondary foliage shoots mostly strongly divaricate or zigzag, usually glabrous throughout except on the margin of the sheaths; blades commonly less than 1 cm. wide, only on vigorous shoots as much as 1.5 cm. wide; panicles usually less than 10 cm. long, the branches deflexed at maturity.

Among shrubs at low altitudes, southern Florida to Brazil and Peru. Originally described from Jamaica.

ECUADOR: Between La Chorita and Portovelo, *Hitchcock* 21180, 21184.

PERU: San Miguel, *Cook & Gilbert* 923.

4. Lasiacis sorghoidea (Desv.) Hitchc. & Chase, Contr. U. S. Nat. Herb. **18**: 338. 1917.

Panicum sorghoideum Desv.; Hamilt. Prodr. Pl. Ind. Occ. 10. 1825.

Erect or clambering to a height of 5 to 7 meters, with a strong central cane as much as 1 cm. thick, the main branches 1 meter or more long, arcuate, bearing slender branchlets toward the pendent ends; sheaths and both surfaces of the blades velvety, or the sheaths glabrescent, the blades of the main branches commonly 20 cm. long and 2.5 cm. wide, those of the branchlets much smaller, often less velvety; panicles usually about 10 to 20 cm. long, at maturity as wide or wider, the spikelets more or less clustered on the long distant branches.

Ravines, wood borders, and hedges, Mexico and the West Indies to Paraguay. Originally described from Porto Rico.

ECUADOR: Río Pilatón, *Sodiro* 311. Milagro, *Hitchcock* 20295. Huigra, *Hitchcock* 20362, 20376, 20607; *Rose* 22184, Cashurco, *Hitchcock* 21775, 21806, 21808. Between Santa Rosa and La Chorita, *Hitchcock* 21146. Between La Chorita and Portovelo, *Hitchcock* 21196. Guayaquil, *Hitchcock* 20133; *Jameson* 703 (Kew Herb.). Portovelo, *Rose* 23374, 23401.

PERU: Colonia Perené, *Hitchcock* 22052, 22054, 22118, 22119, 22120, 22122, 22125. Pozuzo, *Macbride* 4571. La Merced, *Macbride* 5298. Without locality, *Mathews* 2111 (Kew Herb.).

BOLIVIA: Chulumani, *Hitchcock* 22652. Milluhuaya, *Buchtien* 4271. Coroico, *Buchtien* 3635. Antahuacana, *Buchtien* 2500. Mapiri, *Buchtien* 6442. Guanay, *Rusby* 191. Cochabamba, *Bang* 1289, 1291. Buena Vista, *Steinbach* 5551, 7111.

Urban[38] takes up *Panicum maculatum* Aubl. for this species. Aublet's meager description[39] does not identify the plant. The synonym cited refers to a manuscript plate at Berlin which Urban states probably represents *Lasiacis sorghoidea*. The plate was based on a plant from Martinique. Aublet's flora treats of the plants of French Guiana.

5. Lasiacis ruscifolia (H. B. K.) Hitchc. & Chase, Contr. U. S. Nat. Herb. **18**: 339. 1917.

Panicum ruscifolium H. B. K. Nov. Gen. & Sp. 1: 101. 1816.

More robust than any other species, freely branching, with numerous leafy dorsiventral shoots; blades as much as 4.5 cm. broad, velvety or glabrous beneath, glabrous or scabrous above; sheaths glabrous or nearly so; panicles scarcely exserted, oblong or club-shaped, usually compactly flowered.

Climbing over bushes, Mexico, whence originally described, and West Indies to Ecuador.

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[38] Repert. Nov. Sp. Fedde **16**: 149. 1919.

[39] Aubl. Pl. Guian. **1**: 51. 1775.

ECUADOR: Guayaquil, *Holway* 801; *Hitchcock* 19963, 20125, 20129, 20135, 20136, 20158; *Anthony & Tate* 63; *Jameson* 587 (Kew Herb.). Oil Camp between Guayaquil and Salinas, *Hitchcock* 20057. Panigón Plantation, *Hitchcock* 20569, 20576, 20584. Milagro, *Hitchcock* 20236. Teresita, *Hitchcock* 20432, 20524. Between Santa Rosa and La Chorita, *Hitchcock* 21130. Without locality, *Eggers* 15553 (Kew Herb.).

PERU: Colonia Perené, *Hitchcock* 22053. Pozuzo, *Macbride* 4563.

98. SACCIOLEPIS Nash

Inflorescence a narrow spikelike panicle; spikelets pointed, the second glume and sterile lemma inflated (the glume more or less saccate), much larger than the minutely stipitate fruit.

1. **Sacciolepis myuros** (Lam.) Chase, Proc. Biol. Soc. Washington **21**: 7. 1908.
   Panicum myuros Lam. Tabl. Encycl. 1: 172. 1791.

A slender glabrous annual as much as 1 meter tall, with elongate linear blades, the panicles compact, spikelike, about 5 mm. thick; spikelets about 2 mm. long.

Swamps and wet places, Mexico to Brazil. Originally described from tropical America.

BOLIVIA: Buena Vista, *Steinbach* 7030.

99. HYMENACHNE Beauv.

Spikelets short-pedicellate in long, dense, spikelike or interrupted panicles; spikelets acuminate; lemma and palea scarcely indurate, the margins of the lemma flat, the palea not inclosed above.

Inflorescence dense, spikelike ..... 1. H. amplexicaulis.
Inflorescence long and narrow with ascending branches, not spikelike. 2. H. donacifolia.

1. **Hymenachne amplexicaulis** (Rudge) Nees, Agrost. Bras. 276. 1829.
   Panicum amplexicaule Rudge, Pl. Guian. 21. *pl.* 27. 1805.

A glabrous perennial, with succulent, sparingly branching culms, often decumbent and rooting below, broad linear cordate-clasping blades, and panicles about 8 mm. thick and 20 to 50 cm. long.

Swamps and shallow water, often forming pure colonies. Tropics and subtropics of both hemispheres. Originally described from British Guiana.

ECUADOR: Oil Camp between Guayaquil and Salinas, *Hitchcock* 20074.

2. **Hymenachne donacifolia** (Raddi) Chase, Journ. Washington Acad. Sci. **13**: 177. 1923.
   Panicum donacifolium Raddi, Agrost. Bras. 44. 1823.
   Panicum auriculatum Willd. in Spreng. Syst. Veg. 1: 322. 1825.
   Panicum polystachyum Presl, Rel. Haenk. 1: 312. 1830. (Peru.)
   Hymenachne auriculata (Willd.) Chase, Proc. Biol. Soc. Washington **21**: 5. 1908.

Similar to *H. amplexicaulis;* olivaceous throughout (at least when dry), the panicles of numerous ascending, densely flowered branches, the lower distant.

River banks and shallow water, Cuba to Brazil. Originally described from Brazil.

ECUADOR: Balao, *Eggers* 14633.

100. HOMOLEPIS Chase

Inflorescence paniculate; spikelets rather large, subfusiform; first and second glumes subequal, 7 to 9-nerved, the pair wholly covering the sterile and fertile florets; sterile lemma nearly as long as the glumes, broad, infolding the fertile

lemma, and inclosing a narrow hyaline palea and sometimes a staminate flower; fruit elliptic, pointed, smooth and shining, the lemma and palea less indurate than in *Panicum*, the margins of the lemma flat.

1. **Homolepis aturensis** (H. B. K.) Chase, Proc. Biol. Soc. Washington **24**: 146. 1911.

Panicum aturense H. B. K. Nov. Gen. & Sp. **1**: 103. *pl. 33*. 1816.

A creeping straggling perennial, the ascending culms 30 to 50 cm. tall, with narrowly lanceolate, flat blades 1 to 1.5 cm. wide, and narrow, pale brown panicles 5 to 10 cm. long.

Marshes and wet places, Mexico to Brazil and Bolivia. Originally described from Venezuela.

ECUADOR: Napo River, *Jameson* 764 (Kew Herb.).

BOLIVIA: Buena Vista, *Steinbach* 5120, 7013.

101. ISACHNE R. Br.

Inflorescence paniculate; spikelets small, subglobose; glumes subequal; lower floret perfect or staminate, its lemma and palea indurate and similar in form and texture to those of the upper floret; both fruits plano-convex, nearly equal in size, usually remaining attached by the minute rachilla joint between them.

Blades mostly more than 15 cm. long; panicle branches ascending, the spikelets aggregate toward the ends ..... 1. I. arundinacea.

Blades rarely more than 5 cm. long; panicle branches few-flowered, rigidly spreading ..... 2. I. rigens.

1. **Isachne arundinacea** (Swartz) Griseb. Fl. Brit. W. Ind. 553. 1864.

Panicum arundinaceum Swartz, Prodr. Veg. Ind. Occ. 24. 1788.

Climbing among shrubs or small trees to a height of as much as 6 meters, with strong canes and elongate branches; blades commonly 20 cm. long and 1.5 to 2 cm. wide, scabrous; panicles about 12 cm. long, the long lower branches at first ascending, finally wide-spreading; spikelets crowded toward the ends of the branches.

Wooded hillsides, up to 2,500 meters, Mexico and the West Indies to Bolivia. Originally described from Jamaica.

ECUADOR: Teresita, *Hitchcock* 20534. Between Baños and Mera, *Hitchcock* 21756. Between La Chorita and Portovelo, *Hitchcock* 21205. Between Loja and San Lucas, *Hitchcock* 21454. Mount Chimborazo, alt. 1,000 meters, *Spruce* 6128 (Kew Herb.). Las Juntas, *Rose* 23237.

PERU: Hacienda Pampayacu, *Macbride* 5048.

BOLIVIA: Hacienda Casana, *Buchtien* 7117. Yungas, *Rusby* 6; *Bang* 297.

2. **Isachne rigens** (Swartz) Trin. Gram. Pan. 252. 1826.

Panicum rigens Swartz, Prodr. Veg. Ind. Occ. 23. 1788.

Tufted; culms long, slender, wiry, trailing, the numerous flowering shoots curving upward, the firm divergent scabrous blades 3 to 5 cm. long, 3 to 7 mm. wide, the pyramidal panicles 3 to 5 cm. long, about three-fourths as wide.

Damp shady banks, Jamaica, whence originally described, and Venezuela to Ecuador.

ECUADOR: Andes of Quito, *Jameson* 347 (Kew Herb.)

102. OPLISMENUS Beauv.

Inflorescence of several thick racemes along a common axis; spikelets subsessile; glumes and sterile lemma awned or the latter mucronate only; fruit as in *Panicum*, acute.

Awns antrorsely scabrous; plants annual ..... 1. O. burmanni.

Awns smooth or obscurely roughened; plants perennial.
Racemes closely flowered, the lower 1 to 2 cm. long ..... 2. O. hirtellus.
Racemes loosely flowered, the lower 2 to 5 cm. long, the lower pairs of spikelets as much as 1 cm. apart ..... 3. O. rariflorus.

1. **Oplismenus burmanni** (Retz.) Beauv. Ess. Agrost. 54. 1812.
Panicum burmanni Retz. Obs. Bot. 3: 10. 1783.
Oplismenus cristatus Presl, Rel. Haenk. 1: 323. 1830.

A low, creeping, freely branching annual, with pilose sheaths, broadly lanceolate-elliptic blades, and 3 to 5 pale villous ascending racemes approximate along a flexuous axis; awns slender, about 1 cm. long.

Open or somewhat shaded ground and waste places, Mexico to Brazil and Ecuador. Common in the tropics of the Old World, whence probably introduced into America. Originally described from India.

ECUADOR: Puembo, *Mille* 312. Oil Camp between Guayaquil and Salinas, *Hitchcock* 20080. Milagro, *Hitchcock* 20175. Tandapí, *Holmgren* 860. Baños, *Hitchcock* 21916. Tungurahua Volcano, *Tate* 569. Guayaquil, *Jameson* 365; *Spruce* 6326 (both Kew Herb.). Huigra, *Rose* 22141.

2. **Oplismenus hirtellus** (L.) Beauv. Ess. Agrost. 54, 168. 1812.
Panicum hirtellum L. Syst. Nat. ed. 10. 2: 870. 1759.

A slender creeping branching perennial, the ascending or erect flower culms 30 to 50 cm. tall, the lanceolate blades undulate-margined; racemes ascending or spreading, as much as 3 cm. long, usually 1 to 2 cm.; sheaths glabrous or hirsute.

Moist woods and shady banks, throughout tropical America. Originally described from Jamaica.

ECUADOR: Perucho, *Mille* 313. Guayaquil, *Hitchcock* 20147; *Jameson* 396 (Kew Herb.). Milagro, *Hitchcock* 20237. Panigón Plantation, *Hitchcock* 20573. Between La Chorita and Portovelo, *Hitchcock* 21177.

PERU: Colonia Perené, *Hitchcock* 22104, 22117. San Miguel, *Cook & Gilbert* 938. Hacienda Pampayacu, *Macbride* 5026. Río Huallaga Canyon, *Macbride* 4251. Without locality, *Mathews* 1079 (Kew Herb.).

BOLIVIA: Coripata, *Bang* 2079. La Florida, *Hitchcock* 22632. Reyes, *White* 1203. Yungas, *Rusby* 41. Hacienda Simaco, *Buchtien* 5301. Sirupaya, *Buchtien* 432. Buena Vista, *Steinbach* 7010.

3. **Oplismenus rariflorus** Presl, Rel. Haenk. 1: 320. 1830.

Resembling *O. hirtellus*, but the racemes longer and more slender, loosely flowered, 2 to 5 cm. long.

Moist shady places, Mexico, whence originally described, to Peru.

ECUADOR: El Recreo, *Eggers* 14897. Teresita, *Hitchcock* 20429. Guayaquil, *Mille* 8.

PERU: Mountains of Huánuco, *Haenke*.

103. ECHINOCHLOA Beauv.

Inflorescence paniculate, the usually compact, densely flowered panicle composed of 1-sided racemes or of subsimple branches; spikelets hispid or spiny; glumes usually mucronate; sterile lemma usually awned; fruit subindurate, acuminate-pointed, the summit of the palea not inclosed.

Spikelets awnless or mucronate only; racemes simple, rather remote.
1. E. colonum.
Spikelets more or less awned; racemes subcompound, approximate.
2. E. crusgalli crus-pavonis.

1. **Echinochloa colonum** (L.) Link, Hort. Berol. **2**: 209. 1833.

Panicum colonum L. Syst. Nat. ed. 10. **2**: 870. 1759.

Panicum colonum var. ***humile*** Nees, Act. Acad. Caes. Leop. Carol. **19**: Suppl. **1**: 7. 1841; 139. 1843. (Peru, *Meyen.*)

A glabrous tufted annual, the culms compressed, branching at the more or less decumbent base; blades flat, linear, about 5 mm. wide, sometimes barred with purplish brown; racemes usually 5 to 10, ascending, distant nearly their own length on the strict axis.

Ditches and moist places in the warmer parts of both hemispheres; introduced in America, whence originally described.

ECUADOR: Oil Camp between Guayaquil and Salinas, *Hitchcock* 20083. Chanduy, *Spruce* 6425 (Kew Herb.). Without locality, *Jameson* 346.

2. **Echinochloa crusgalli crus-pavonis** (H. B. K.) Hitchc. Contr. U. S. Nat. Herb. **22**: 148. 1920.

Oplismenus crus-pavonis H. B. K. Nov. Gen & Sp. 1: 108. 1816.

Panicum sabulicola Nees, Agrost. Bras. 258. 1829.

An erect, often robust, usually fleshy annual, branching at base, with nearly simple culms often decumbent and rooting at base, and long narrow nodding panicles of usually long-awned spikelets.

Swamps and ditches, throughout tropical America. Originally described from Venezuela.

PERU: Lima, *Hitchcock* 22342, 22428; *Holway* 785.

BOLIVIA: Cochabamba, *Hitchcock* 22805; *Holway* 323, 412. Coripata, *Hitchcock* 22693; *Bang* 2108. Hacienda Simaco, *Buchtien* 5313. Coroico, *Buchtien* 3624. Reyes, *Rusby* (*Mulford Biol. Expl.*) 1635. Sorata, *Mandon* 1258 (Kew Herb.). Quiabaya, *Mandon* 1257 (Kew Herb.).

104. CHAETOCHLOA Scribn.

Inflorescence a dense spikelike (rarely loose) panicle, the spikelets solitary or in small clusters subtended by 1 to several slender scabrous bristles (sterile branchlets), these persistent after the fall of the spikelets; spikelets as in *Panicum*, turgid, the fruit usually transversely rugose.

Bristles below only the terminal spikelets of each branchlet, hence the bristles few and inconspicuous (more numerous in *C. membranifolia*); blades plaited (except in *C. cernua*). Plants perennial (except *C. membranifolia.*) (Subgenus PTYCHOPHYLLUM.)

Panicles open, usually large, the slender branches more or less drooping.

Blades strongly plaited, sometimes as much as 10 cm. wide.

2. C. sulcata.

Panicles narrow, compact.

Panicles 30 to 60 cm. long, the branches ascending, approximate, mostly 3 to 5 cm. long; blades strongly plaited. Spikelets secund, 3 mm. long.

1. C. poiretiana.

Panicles smaller; blades not strongly plaited.

Plants annual; blades elliptic-lanceolate, thin, somewhat plaited; panicles rather loose, about 10 cm. long; spikelets 2 mm. long

3. C. membranifolia.

Plants perennial; blades linear, firm, not plaited; panicles dense and narrow, 10 to 30 cm. long, nodding at the attenuate apex; spikelets 3 mm. long----------**4. C. cernua.**

Bristles below all the spikelets; blades linear-lanceolate to linear, not plaited: panicles mostly dense and spikelike.
Bristles below each spikelet numerous, at least more than 5. Panicle dense, cylindric, spikelike----------5. C. geniculata.
Bristles below each spikelet 1 or, by abortion of the spikelets, 2 or 3.
Bristles more or less retrorsely scabrous.
Plants perennial; spikelets globose or nearly so, 2 mm. long--6. C. tenax.
Plants annual; spikelets not globose.
Spikelets 2 mm. long----------7. C. verticillata.
Spikelets 1.5 mm. long. Panicles adhesive, at maturity pulling from the sheaths.
Panicles usually green, rarely as much as 8 cm. long, the bristles 2 to 3 mm. long----------8. C. scandens.
Panicles usually purple, as much as 15 cm. long, the bristles about 1 cm. long----------9. C. tenacissima.
Bristles antrorsely scabrous only.
Panicle loose, the branches distant; fruit smooth------10. C. oblongata.
Panicle dense; fruit minutely rugose.
Panicles of main culm 20 to 30 cm. long, 2 to 5 cm. thick.
11. C. vulpiseta.
Panicles of main culm, mostly not more than 10 cm. long and 1 cm. thick.
Nodes bearded----------13. C. barbinodis.
Nodes glabrous.
Blades pubescent----------12. C. argentina.
Blades glabrous, somewhat scabrous--------14. C. trichorhachis.

1. **Chaetochloa poiretiana** (Schult.) Hitchc. Contr. U. S. Nat. Herb. **22**: 159. 1920.

Panicum elongatum Poir. in Lam. Encycl. Suppl. **4**: 278. 1816. Not *P. elongatum* Salisb., 1796.

Panicum poiretianum Schult. Mant. **2**: 229. 1824.

Setaria poiretiana Kunth, Rev. Gram. **1**: 47. 1829.

A tall cespitose perennial with compressed culms and sheaths, the internodes sulcate on the side toward the sheaths, thin, strongly plaited blades commonly 50 cm. long and 5 cm. wide, and elongate narrow panicles with slender bristles several times longer than the spikelets.

Moist woods, Mexico to Brazil and Bolivia. Originally described from Brazil.

ECUADOR: Between Huigra and Naranjapata, *Hitchcock* 20682. Nanegal, *Sodiro* in 1902. Angamarca, *Sodiro* 306. Ambato, *Pachano* 245.

PERU: Colonia Perené, *Hitchcock* 22095. Santa Ana, *Cook & Gilbert* 1429, 1523.

BOLIVIA: Coroico, *Hitchcock* 22714, 22719. Antahuacana, *Buchtien* 2508. Rurrenabaque, *White* 1820.

This species was described in the "Grasses of the West Indies"[40] under *Chaetochloa sulcata*.

2. **Chaetochloa sulcata** (Aubl.) Hitchc. Contr. U. S. Nat. Herb. **17**: 260. 1913.

Panicum sulcatum Aubl. Pl. Guian. **1**: 50. 1775.

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[40] Contr. U. S. Nat. Herb. **18**: 348. 1917.

Setaria sulcata A. Camus, Bull. Mus. Hist. Nat. 30: 108. 1924. Not *S. sulcata* Raddi, 1823.

Setaria effusa Fourn. Mex. Pl. 2: 42. 1886.

On the average taller than the preceding, the sheaths hispid, blades larger, panicle larger, the numerous long slender branches drooping.

Rocky woods and shady banks, West Indies to Ecuador. Originally described from Martinique.

ECUADOR: Bodegas, *Sodiro* 307. Teresita, *Hitchcock* 20538. Napo River, *Jameson* 725 (Kew Herb.).

3. Chaetochloa membranifolia (Herrm.) Hitchc.

Setaria membranifolia Herrm. Beitr. Biol. Pflanz. 10: 61. 1910.

A lax annual, with decumbent culms about 60 to 100 cm. tall, thin flat elliptic-lanceolate blades 15 cm. long and as much as 2 cm. wide, and narrow, rather loose panicles about 10 cm. long, the spikelets about 2 mm. long.

In shady places, western Ecuador. (Type, *Spruce* 6448.)

ECUADOR: Balao, *Eggers* 14584; *Jameson* 372 (Kew Herb.). Chanduy, *Spruce* 6448.

This species has the aspect of *C. barbata* (Lam.) Hitchc. & Chase, a common weed in the West Indies, but the spikelets are smaller.

4. Chaetochloa cernua (H. B. K.) Hitchc.

Setaria cernua H. B. K. Nov. Gen. & Sp. 1: 111. 1816.

Panicum stenothyrsum Pilger, Bot. Jahrb. Engler 21: 710. 1898. (*Stübel* 247.)

An erect perennial 50 to 100 cm. tall, with a stout leafy base, numerous approximate keeled sheaths villous at least at the throat, flat blades as much as 40 cm. long and 2 cm. wide narrowed at base, and dense narrow pale panicles 10 to 30 cm. long usually nodding at the apex, the branches short and appressed or in larger specimens as much as 3 cm. long and ascending; spikelets about 3 mm. long, the bristles few and short.

Dry or rocky slopes, Ecuador, the type from Río Guallabamba. (*Bonpland.*)

ECUADOR: Huigra, *Hitchcock* 20361. Ambato, *Hitchcock* 21704; *Pachano* 109. Alausí, *Hitchcock* 20772. Otavalo to Malchinguí, *Hitchcock* 20833. Tumbaco, *Mille* 308. Riobamba, *Sodiro* in 1901; *Stübel* 247. Chambo River, *Spruce* 5814. Pomasqui, *Jameson* 253 (Kew Herb.).

5. Chaetochloa geniculata (Lam.) Millsp. & Chase, Field Mus. Bot. 3: 37. 1903.

Panicum geniculatum Lam. Encycl. 4: 727 (err. typ. 737). 1798.

Setaria geniculata Beauv. Ess. Agrost. 51, 178. 1812.

Setaria purpurascens H. B. K. Nov. Gen. & Sp. 1: 110. 1816. (Near Quito.)

Tufted, the slender compressed culms erect, geniculate at base, or sometimes spreading, the blades mostly 5 to 8 mm. wide, the long-exserted, dense, spike-like, yellow or purplish panicle 5 to 10 cm. long, 6 to 8 mm. thick excluding the bristles. The bristles vary in length and color. Early in the season they are longer than the spikelets, but on later panicles they may be shorter than the spikelets.

Open ground, waste places, and grassland, throughout the American tropics and northward into southern and eastern United States. Originally described from Guadeloupe.

ECUADOR: Vicinity of Quito, *Harteman* 2, 18, 28, 54; *Hartweg* 1448; *Lehmann* 467; *Mille* 317; *Jameson* 105, 186. Huigra, *Hitchcock* 20313, 20608. Teresita, *Hitchcock* 20472. Baños, *Hitchcock* 21902; *Lehmann* 5285 (Kew Herb.). Be-

tween Loja and San Lucas, *Hitchcock* 21486. Portovelo, *Hitchcock* 21266. Riobamba, *Spruce* 5809 (Kew Herb.). Chota River, *André* 3560b (Kew Herb.). Zaragura, *Rose* 23159. Tablón de Oña, *Rose* 23076.

PERU: Matucana, *Macbride & Featherstone* 289. Obrajillo, *Wilkes Expl. Exped.* Cuzco, *Hitchcock* 22509. Tarma, *Hitchcock* 22170. Colonia Perené, *Hitchcock* 22109.

BOLIVIA: La Florida, *Hitchcock* 22634, 22646. Yanacachi, *Buchtien* in 1906. Millahuaya, *Buchtien* 4270. Yungas, *Bang* 218, 273. La Paz, *Buchtien* 864. Cotaña, *Buchtien* 3127. Sorata, *Rusby* 222; *Mandon* 1259 (Kew Herb.). Lake Rogagua, *Rusby* (*Mulford Biol. Expl.*) 1433. *Cárdenas* (*Mulford Biol. Expl.*) 1708. Cochabamba, *Hitchcock* 22802; *Shepard* 259; *Holway* 348. Antahuacana, *Buchtien* 2506. Between Río Piray and Río Cuchi, *Herzog* 1443. Tarija, *Fries* 1116a.

6. Chaetochloa tenax (L. Rich.) Hitchc. Contr. U. S. Nat. Herb. **22**: 176. 1920.

Panicum tenax L. Rich. Act. Soc. Hist. Nat. Paris **1**: 106. 1792.

Setaria tenax Desv. Opusc. 78. 1831.

Tufted, erect, commonly 1 meter tall, the culms and sheaths compressed, the numerous elongate blades mostly 0.8 to 1.2 cm. wide, usually reaching beyond the base of the rather loose panicle of large globose spikelets and long flexuous bristles.

Savannas, rocky banks, and open woods, West Indies to Uruguay. Originally described from French Guiana.

ECUADOR: Oil Camp between Guayaquil and Salinas, *Hitchcock* 20124. Between Huigra and Naranjapata, *Hitchcock* 20654.

BOLIVIA: Coripata, *Hitchcock* 22685.

The Ecuador specimens are referred here doubtfully. The specimens are past maturity and most of the spikelets have fallen.

7. Chaetochloa verticillata (L.) Scribn. U. S. Dept. Agr. Div. Agrost. Bull. **4**: 39. 1897.

Panicum verticillatum L. Sp. Pl. ed. 2. **1**: 82. 1762.

Setaria verticillata Beauv. Ess. Agrost. 51. 1812.

Culms slender, compressed, geniculate and branching below; blades thin, lanceolate-linear; spikes short, green or purplish, the slender bristles retrorsely barbulate.

A weed in fields and waste places, temperate and warmer regions of both hemispheres, introduced in America. Originally described from southern Europe.

PERU: Lima, *Mathews* 429 (Kew Herb.).

8. Chaetochloa scandens (Schrad.) Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. **21**: 17. 1900.

Setaria scandens Schrad.; Schult. Mant. **2**: 279. 1824.

Repeatedly branching at the geniculate lower nodes, the slender culms usually 20 to 50 cm. tall, the thin blades sparsely pilose, the slender adhesive panicles 2 to 8 cm. long, 4 to 5 mm. thick (excluding bristles), interrupted below, the bristles ascending, exceeding the small turgid spikelets only 2 or 3 mm.

Open ground, Guatemala and West Indies to Peru and Paraguay. Originally described from a garden specimen in Vienna, the native country unknown.

PERU: Between Tarma and La Merced, *Hitchcock* 22158.

BOLIVIA: San José, *Hitchcock* 22740. Coroico, *Buchtien* 449, 3627. Yanacachi, *Buchtien* 425. Hacienda Simaco, *Buchtien* 5330.

9. Chaetochloa tenacissima (Schrad.) Hitchc. & Chase. Contr. U. S. Nat. Herb. **18**: 352. 1917.

Setaria tenacissima Schrad.; Schult. Mant. **2**: 279. 1824.

Culms slender but strong, 1 meter or more tall, leaning or clambering, the long narrow blades very scabrous, the panicles 10 to 15 cm. long, with long slender divaricate bristles and small spikelets nearly black at maturity.

Brushy hillsides, Guatemala to Brazil and Bolivia. Originally described from Brazil.

PERU: Without locality, *Mathews* 2105 (Kew Herb.).

BOLIVIA: Coroico, *Hitchcock* 22717. Sirupaya, *Buchtien* 435. Hacienda Simaco, *Buchtien* 5329.

10. Chaetochloa oblongata (Griseb.) Hitchc.

Panicum oblongatum Griseb. Abh. Ges. Wiss. Göttingen **19**: 261. 1874.

Setaria leiocarpa Herrm. Beitr. Biol. Pflanz. **10**: 62. 1910.

A slender branching perennial 1 to 1.5 meters tall, with flat blades 8 to 12 mm. wide, loose panicles about 20 cm. long, and elliptic spikelets 2 mm. long, the bristles about 5 mm. long.

Among shrubs, Bolivia to Argentina. Originally described from Argentina (*Lorentz* 237).

BOLIVIA: Sorata, *Mandon* 1260 (cited with the original description).

11. Chaetochloa vulpiseta (Lam.) Hitchc. & Chase, Contr. U. S. Nat. Herb. **18**: 350. 1917.

Panicum vulpisetum Lam. Encycl. **4**: 735 (err. typ. 745). 1798.

Setaria vulpiseta Roem. & Schult. Syst. Veg. **2**: 495. 1817.

In large clumps 1 to 2 meters tall, the culms strongly compressed, the numerous thin blades commonly 50 cm. long and 3 cm. wide, tapering into a long petiolelike base, the bristly spikelike panicle 20 to 30 cm. long and about 2.5 cm. thick, tapering to both ends, the secondary panicles much smaller.

Copses and brushy slopes, West Indies and Central America to Paraguay. Originally described from Santo Domingo.

ECUADOR: Guayaquil, *Hartweg* 704. Panigón Plantation, *Hitchcock* 20581. Otavalo to Malchinguí, *Hitchcock* 20830. Between Santa Rosa and La Chorita, *Hitchcock* 21137. Portovelo, *Hitchcock* 21273.

PERU: Colonia Perené, *Hitchcock* 22094. Santa Ana, *Cook & Gilbert* 1548.

BOLIVIA: San Buena Ventura, *Cárdenas* (*Mulford Biol. Expl.*) 1893. Buena Vista, *Steinbach* 6842.

12. Chaetochloa argentina (Herrm.) Hitchc.

Setaria argentina Herrm. Beitr. Biol. Pflanz. **10**: 54. 1910.

An erect cespitose perennial 50 to 100 cm. tall, with flat or folded, pubescent blades, and dense spikelike panicles 8 to 12 cm. long, the spikelets acutish, about 2.5 mm. long, the bristles extending beyond the spikelets about 5 mm.

Fields and open ground, Argentina to Bolivia. Originally described from Córdoba, Argentina.

BOLIVIA: Cochabamba, *Hitchcock* 22803; *Buchtien* 2510. Cotaña, *Buchtien* 3128. Sorata, *Mandon* 1262.

13. Chaetochloa barbinodis (Herrm.) Hitchc.

Setaria barbinodis Herrm. Beitr. Biol. Pflanz. **10**: 60. 1910.

Resembling *C. argentina*, but the blades scabrous, not pubescent, and the spikelets larger and more globose; nodes pubescent.

Known only from the type collection.

BOLIVIA: Sorata, *Mandon* 1261.

14. Chaetochloa trichorhachis (Hack.) Hitchc.

Setaria liebmanni var. *trichorhachis* Hack. Repert. Nov. Sp. Fedde 8: 46. 1910.

A cespitose perennial 40 to 80 cm. tall, with flat scabrous blades as much as 1.5 cm. wide, and dense spikelike panicles 5 to 8 cm. long, the spikelets about 3 mm. long.

Paraguay, whence originally described, to Bolivia.

BOLIVIA: "Bolivian Plateau," *Bang* 2160.

105. PENNISETUM L. Rich.[41]

Spikelets 1, or rarely 2 together, subtended by a whorl of slender bristles (sterile branchlets), subsessile along a common axis forming bristly spikes, the bristles falling attached to the lanceolate spikelet.

Plants annual----------1. P. annuum.
Plants perennial.
  Plants low, creeping, forming dense mats; introduced----2. P. clandestinum.
  Plants tall, not creeping; native.
    Panicles terminal on the primary culm and leafy branches only, mostly more than 10 cm. long. (See also no. 8 with short panicles, axillary ones sometimes wanting.)
      Bristles conspicuously plumose----------3. P. setosum.
      Bristles not plumose.
        Bristles fine and silky, commonly 3 cm. long. Blades 5 to 6 cm. wide. 4. P. peruvianum.
        Bristles not more than 2 cm. long.
          Panicles stiff, grayish to purplish, the persistent stigmas conspicuous. 5. P. chilense.
          Panicles flexuous, pale yellowish to tawny, the small stigmas not or scarcely visible.
            Bristles unequal but none conspicuously longer and stouter than the rest----------6. P. nervosum.
            Bristles conspicuously unequal, one 3 to 4 times as long as the rest. 7. P. occidentale.
    Panicles terminal and axillary, the latter on slender naked peduncles 1 to several from a sheath (axillary sometimes wanting in no. 8).
      Panicles few, bristly, rather stiff and dense----------8. P. rupestre.
      Panicles several to numerous, if dense the bristles fine and more or less flexuous.
        Bristles of the fascicles few and short, or in some fascicles obsolete. 9. P. mutilatum.
        Bristles of the fascicles several to numerous.
          Bristles several, most of them not much longer than the spikelet, one (except in no. 10) conspicuously longer than the rest.
            Blades not more than 1.5 cm. wide; spikelets 6 mm. or more long.
              Spikelets 7 to 8 mm. long; one bristle not conspicuously longer than the rest----------10. P. intectum.
              Spikelets 6 mm. long; one bristle conspicuously longer than the rest----------11. P. weberbaueri.
            Blades 2.5 to 5 cm. wide; spikelets about 5 mm. long. 12. P. latifolium.

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[41] Contributed by Agnes Chase.

Bristles numerous, most of them much longer than the spikelet; one longer than the rest but not conspicuously so. Panicle chenille-like.

Sterile floret empty, the spikelet flattish; panicles mostly rather dense----------13. P. tristachyum.

Sterile floret with a well-developed staminate palea and usually a flower; panicles looser, the axis visible between the fascicles. 14. P. bambusiforme.

1. Pennisetum annuum Mez, Bot. Jahrb. Engler **56**: Beibl. **125**: 7. 1921.

A weak-stemmed, sparingly branching annual as much as 70 cm. tall, with scabrous flat blades 6 to 20 cm. long and 5 to 10 mm. wide, and pale, terminal and axillary panicles mostly 2.5 to 3 cm. long on slender peduncles, the fascicles with numerous fine bristles shorter than the single spikelet and one purplish falcate bristle 1.5 to 2 cm. long.

On rocky slopes at middle altitudes, Peru. (Type, *Weberbauer* 5354.)

PERU: Matucana, *Macbride & Featherstone* 280. Chosica, *Weberbauer* 5354.

2. Pennisetum clandestinum Hochst.; Chiov. Annuar. Ist. Bot. Roma **8**: 41. 1903.

Pennisetum longistylum var. *clandestinum* Leeke, Zeitschr. Naturw. **79**: 23. 1907.

A stoloniferous perennial forming dense sod, with short, flat, sparsely pilose blades and small terminal few-flowered panicles wholly or partly inclosed in the sheaths.

Open hills at middle altitudes. Introduced for forage from Africa, where it is known as Kikuyu grass. "At Arequipa the Kikuyu grass was growing in a pasture where it formed (being the dry season) a dense short sod. Here and there stamens could be seen arising from flowers hidden in the leaves. The filaments were erect, very slender, 2 to 3 cm. long. In other flowers the long styles arose but were not so conspicuous as the stamens. I was informed that in the rainy season the stems arose to the height of about 1 meter."—A. S. H., field book.

PERU: Chuquibambilla, *Hitchcock* 22449. Arequipa, *Hitchcock* 22439.

3. Pennisetum setosum (Swartz) L. Rich. in Pers. Syn. Pl. **1**: 72. 1805.

Cenchrus setosus Swartz, Prodr. Veg. Ind. Occ. 26. 1788.

A tall, leafy, branching perennial, erect or ascending from a geniculate base, the long flat blades pubescent or scabrous, the purplish spikes 10 to 15 cm. long, the slender fascicles at maturity spreading horizontally or slightly reflexed.

Open or brushy slopes, Florida and the West Indies to Colombia and Brazil. Originally described from the West Indies.

ECUADOR: Between Huigra and Naranjapata, *Hitchcock* 20659. Between La Chorita and Portovelo, *Hitchcock* 21156. Between Portovelo and El Tambo, *Hitchcock* 21310. Ventura, *Rose* 23513.

BOLIVIA: Coripata, *Bang* 2168. Hacienda Anacuri, *Holway* 714. Chulumani, *Hitchcock* 22661. Villa Aspiazu, *Holway* 687.

4. Pennisetum peruvianum Trin. Linnaea **10**: 295. 1836.

Gymnothrix peruviana Doell in Mart. Fl. Bras. **2**^{2}: 302. 1877.

A robust, branching, erect or leaning perennial 2 to 3 meters tall, with elongate flat blades 4 to 6 cm. wide, tapering to both ends, scabrous on the upper surface, smooth beneath, and nodding pale silky panicles 15 to 25 cm. long and 3 to 5 cm. thick, the involucral bristles 2 to 3 cm. long.

Brushy or open slopes or banks, at middle altitudes, Ecuador and Peru, whence described. ("And. Peru," *Pöppig.*)

ECUADOR: "Andes Quitenses," *Spruce* in 1865 (Kew Herb.). Río Verde, *Pachano* 239. Between Huigra and Naranjapata, *Hitchcock* 20668. Agoyan, *Spruce* 5937 (Kew Herb.) Between Baños and Cashurco, *Hitchcock* 21822. Pastaza Valley, *Hellborn* 359. Ventura, *Rose* 23509.

PERU: Without locality, *Pöppig.*

5. Pennisetum chilense (Desv.) Jacks. Nov. Act. Soc. Sci. Upsal. IV. 1: 172. 1905.

Gymnothrix chilensis Desv. in Gay, Fl. Chile 6: 251. *pl. 74.* 1853.

Pennisetum chilense var. *planifolia* Hack. Bot. Centralbl. 120: 548. 1912, name only. (*Buchtien* 842.)

A glaucous perennial, with sparingly branching culms 1 to 2 meters tall, suberect from tough hard rhizomes, elongate, scabrous, flat or folded blades 3 to 10 mm. wide, and dense, rather stiff, grayish to pale purplish panicles 8 to 20 cm. long and about 1.5 cm. thick, the bristles mostly less than twice the length of the spikelets, one bristle coarser and longer at least in the upper fascicles, the long brown stigmas persistent, conspicuous.

Open dry slopes, mostly at higher altitudes, Bolivia, Argentina, and Chile, whence originally described.

BOLIVIA: La Paz, *Buchtien* 842; *Bang* 55; *Cárdenas* 72 S; *Holway* 438. Palca, *Hitchcock* 22583. Cochabamba, *Hitchcock* 22827, 22858. Oploca, *Hitchcock* 22898. Tarija, *Fiebrig* 2595.

6. Pennisetum nervosum (Nees) Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 1: 177. 1834.

Gymnothrix nervosa Nees, Agrost. Bras. 277. 1829.

A robust perennial 2 to 3 meters tall, usually in clumps and decumbent at base, and with appressed branches above; blades elongate, 8 to 15 mm. wide, scabrous; panicles dense, yellowish to tawny, 12 to 20 cm. long, 12 to 15 mm. thick, flexuous and at maturity commonly with a pronounced S-shaped bend in the middle; bristles stiff, unequal, about one-third of them exceeding the spikelet, rarely none longer.

Brushy or open, mostly moist ground, at low altitudes, Brazil, whence originally described, and Ecuador to Argentina.

ECUADOR: Milagro, *Hitchcock* 20254. Panigón Plantation, *Hitchcock* 20602.

7. Pennisetum occidentale Chase, sp. nov.

Plants perennial, robust, in large clumps, glabrous as a whole; culms solid or pithy, obtusely angled, straggling or creeping at base, with prop roots at the lower nodes, as much as 3 meters tall, with numerous ascending, more or less geniculate branches; sheaths keeled, loose, the upper scaberulous toward the truncate or slightly auriculate summit; ligule fimbriate-ciliate, 1 to 1.5 mm. long; blades flat, spreading, 20 to 60 cm. long, 1 to 2 cm. wide, smaller on the ultimate branches, scarcely tapering to a truncate or rounded base (the junction of sheath and blade somewhat constricted), very scabrous on the margin and upper surface, scabrous or nearly smooth beneath, the epidermis rather coarsely cellular (the cells visible under a lens); panicles rather short-exserted from the ends of the numerous leafy branches, often overtopped by the upper blades, mostly 8 to 12 cm. long, 10 to 12 mm. thick excluding the longer bristles, dense, pale, flexuous (with a loose S-shaped bend in the middle at maturity), the rather thick axis densely puberulent, the scars of the fallen fascicles surrounded by white hairs, giving the appearance of stellar pubescence; fascicles spreading, the bristles about 10, fine, scabrous, very unequal, a few exceeding the

spikelet, one 15 to 25 cm. long, fine and straight; spikelets 4.5 to 4.8 mm. long, about 1 mm. wide, lanceolate-acuminate, smooth or scaberulous toward the apex; first glume about one-third the length of the spikelet, 3-nerved, acute; second glume and sterile lemma 7-nerved, sharp-pointed, the glume three-fourths as long as the equal fruit and empty sterile lemma; fruit sharp-pointed, smooth.

Type in U. S. National Herbarium, no. 1,163,831, collected in brushy cut-over land near lagoon, west of Guayaquil, Ecuador, June 20, 1923, by A. S. Hitchcock (no. 19953).

In low ground, coast of Ecuador.

ECUADOR: Chanduy, *Spruce* 6426 (Kew Herb.). Guayaquil, *Hitchcock* 19953; *Mille* 22; *Rose* 22112.

8. Pennisetum rupestre Chase, sp. nov.

Plants perennial, in very loose clumps from relatively slender, creeping rhizomes; culms about 75 cm. tall, angled or terete, short-jointed and branching near the base, the ultimate branches compressed and slender; nodes glabrous; sheaths papillose-pilose at least toward the summit, the lower loose and overlapping; ligule fimbriate-ciliate, about 2 mm. long; blades erect, rather stiff, 12 to 18 cm. long, 5 to 10 mm. wide (the uppermost much reduced), flat, round-truncate at base, tapering to a long subinvolute point, scabrous and sparsely papillose-pilose on the upper surface, slightly scaberulous and glabrous or nearly so beneath; inflorescence terminal and axillary, 1 or 2 slender wiry flat peduncles borne in the sheaths; panicles 2.5 to 7 cm. long, about 1 cm. thick, dense, rather stiff; bristles numerous, scabrous, rather stiff, unequal, most of them slightly shorter than the spikelet, a few equaling it or a little longer, one a little stouter than the rest; spikelets one or two to a fascicle (mostly one, or the second rudimentary), 6 mm. long, about 1.5 mm. wide, lanceolate, acute, scabrous toward the apex; first glume minute or obsolete; second glume 1-nerved, acute, about one-third the length of the equal fruit and empty sterile lemma; fertile lemma and palea but little indurate, the lemma 5-nerved.

Type in U. S. National Herbarium, no. 1,161,395, collected "on disintegrated rock slope," at Matucana, Peru, altitude 2,400 meters, between April 12 and May 3, 1922, by Macbride & Featherstone (no. 453).

Known only from the type and a fragmentary immature specimen without axillary panicles collected by Wilkes exploring expedition, at Obrajillo, Peru.

9. Pennisetum mutilatum (Kuntze) Hack.; Kuntze, Rev. Gen. Pl. 3²: 347. 1898.

Cenchrus mutilatus Kuntze, Rev. Gen. Pl. 3²: 347. 1898.

A relatively slender, glaucous perennial, the culms 1 to 2 meters long, ascending from a long, decumbent, sparingly branching base, rooting at the nodes, the upper part of the culm somewhat zigzag and with appressed leafy branches; sheaths sparsely papillose-hirsute to glabrous; blades flat, spreading, 10 to 20 cm. long, 8 to 30 mm. wide, narrowed to a rounded base, at least those of the main culm with a peduncle 5 to 10 mm. (rarely 20 mm.) long; panicles rather few, nodding on slender peduncles, 5 to 9 cm. long, 5 to 8 mm. thick, loosely flowered; bristles few and short.

No habitat is given with any of the specimens seen; probably on brushy slopes; in the Andes of Bolivia and Argentina, evidently rare. Originally described from Argentina.

BOLIVIA: Sorata, *Mandon* 1264; *Holway* 537.

10. Pennisetum intectum Chase, sp. nov.

Plants perennial; culms solitary or few together, suberect, about 1.5 meters tall, compressed, glabrous or minutely pubescent just below the nodes, bearing few to several slender branches, appressed below, spreading toward the ends; nodes minutely appressed-hirsute to glabrous; sheaths keeled, appressed papillose-hispid except at the base or the upper scabrous only, the lower ones with erect auricles at the summit joining the ligule on either side; ligule membranaceous, firm, about 2 mm. long; blades spreading, 20 to 35 cm. long, flat and 5 to 10 mm. wide in the middle, tapering into an elongate narrow folded base, acuminate, scaberulous on both surfaces, the folded part more or less hispid within; inflorescence terminal and axillary, 2 to 5 long filiform scaberulous peduncles borne in the upper sheaths; panicles drooping, subflexuous, 4 to 6 cm. long, grayish green, loosely flowered, the slender angled zigzag scabrous axis visible between the fascicles; bristles few to several (4 to 10), scabrous, readily breaking, very unequal, mostly shorter than the spikelet, one or two in occasional fascicles exceeding the spikelet, rarely one bristle noticeably longer than the rest; spikelet 7 to 8 mm. long, about 1.5 mm. wide, lanceolate, acuminate, scabrous; first glume about 1.5 mm. long, subacute; second glume a little more than half the length of the spikelet, 3-nerved (or faintly 5-nerved), acute; sterile lemma empty, equaling the fertile floret, 5-nerved, acuminate, depressed down the center; fruit scabrous toward the pointed apex, the palea obscurely pubescent.

Type in U. S. National Herbarium, no. 1,163,845, collected on a grassy open hillside at about 2,500 meters altitude, between Loja and San Lucas, Province of Loja, Ecuador, by A. S. Hitchcock (no. 21477).

This species appears to be intermediate between *P. mutilatum* and *P. weberbaueri*. The specific name refers to the naked spikelets, the bristles being scant.

11. Pennisetum weberbaueri Mez, Notizbl. Bot. Gart. Berlin, 7: 50. 1917.

More slender than *P. tristachyum* and its allies, in dense clumps, 1 to 2 meters tall, rather sparingly branching, the culms and sheaths commonly tinged with vinous purple, the blades 12 to 25 cm. long and 6 to 15 mm. wide, tapering to a narrowly rounded, sometimes short-petiolate base, the panicles 5 to 7 cm. long, mostly purplish-tinged, loosely flowered, the bristles rather scant, flexuous, most of them slightly longer than the spikelets, one two to three times as long.

Moist banks and slopes at middle altitudes, Peru. (Type from Tarma, *Weberbauer* 2393.)

PERU: Obrajillo, *Wilkes Expl. Exped.* Matucana, *Macbride & Featherstone* 256. Cuzco, *Hitchcock* 22511. Tarma, *Hitchcock* 22160. Huanta, *Pearce* in 1867 (Kew Herb.)

12. Pennisetum latifolium Spreng. Syst. Veg. 1: 302. 1825.

Gymnothrix latifolia Schult. Mant. 3: 601. 1827.

Pennisetum lechleri Steud.; Lechl. Berb. Amer. Austr. 56. 1857, name only. (*Lechler* 1925.)

Resembling *P. tristachyum*, less copiously branching, the blades thinner, narrower at the base, more or less scabrous on both surfaces, the panicles 4 to 10 cm. long, greenish, the bristles fewer and stiffer, most of them not exceeding the spikelets, one about twice as long.

Open or brushy, rocky, moist slopes, at middle altitudes, Brazil and Peru to Uruguay, whence described.

PERU: Tabina, *Lechler* 1925.

BOLIVIA: Sorata, *Holway* 503; *Mandon* 1263 (Kew Herb.). Cochabamba, *Hitchcock* 22847. Bermejo, *Fiebrig* 2437.

13. Pennisetum tristachyum (H. B. K.) Spreng. Syst. Veg. **1**: 302. 1825.

Gymnothrix tristachyum H. B. K. Nov. Gen. & Sp. **1**: 113. 1816; **7**: *pl.* 678. 1825.

Cenchrus tristachyus Kuntze, Rev. Gen. Pl. **3**²: 347. 1898.

Pennisetum tristachyon var. *jamesoni* Leeke, Zeitschr. Naturw. **79**: 33. 1907.

A robust perennial 2 to 3 meters or more tall, repeatedly branching above, forming a wide-spreading summit, with flat blades as much as 40 cm. long and 3 cm. wide on the main culm (successively smaller on the branches), scabrous above, glabrous beneath, tapering to a narrowly rounded base, and numerous drooping panicles on slender peduncles, the panicles commonly purple-tinged and 8 to 10 cm. long, flexuous, the fine numerous subflexuous bristles unequal, the longer ones about twice the length of the spikelet.

Open rocky slopes at middle altitudes, Ecuador, the type from Puembo. (*Bonpland.*)

ECUADOR: Tungurahua, *Lehmann* 5394. Cuenca, *Lehmann* 7687. Cotocallao, *Mille* 316. Quito, *Holway* 945. Nieblí, *André* 3419 (Kew Herb.). Huigra, *Hitchcock* 20353. Between Huigra and Naranjapata, *Hitchcock* 20669. Baños, *Spruce* (Kew Herb.) Between Loja and San Lucas, *Hitchcock* 21482. "Andes, Ecuador," *Spruce* in 1857–1859 (Kew Herb.)

13a. Pennisetum tristachyum boliviense Chase, subsp. nov.

Culms as much as 6 meters tall and blades as much as 6 cm. wide; differs from the species in being more leafy at the summit, the blades abruptly attenuate at base, the attenuate part densely silky-ciliate, and in the more silky panicles, the copious fine bristles spreading, pappuslike.

Type in U. S. National Herbarium, nos. 1,163,841 and 1,163,842, collected on a shrubby bank at Coripata, Nor-Yungas, Bolivia, altitude 1,560 meters, December 23, 1923, by A. S. Hitchcock (no. 22687, large leafy sterile shoot, and no. 22729, inflorescence.)

Slopes at middle altitudes in the Yungas region, Bolivia.

BOLIVIA: Coroico, *Bang* 2340; *Buchtien* 451 (Kew Herb.), 3620. Coripata, *Hitchcock* 22687, 22729. La Florida, *Buchtien* 423.

14. Pennisetum bambusiforme (Fourn.) Hemsl. Biol. Centr. Amer. Bot. **3**: 507. 1885; Ind. Kew. **2**: 458. 1894.

Gymnothrix bambusiformis Fourn. Mex. Pl. **2**: 48. 1886.

Resembling *P. tristachyum*, the panicles looser and on the average longer, the spikelets smaller, the bristles proportionately longer, one about twice as long as the others.

Open, rocky, mostly moist slopes, at middle altitudes, southern Mexico to Peru. Originally described from Mexico.

ECUADOR: Cotocallao, *Mille* 316. Between Baños and Cashurco, *Hitchcock* 21762. Ambato, *Rose* 22372. Huigra, *Rose* 22530. Las Juntas, *Rose* 23202.

PERU: Tarma, *Hitchcock* 22149. Santa Ana, *Cook & Gilbert* 1632.

Gymnothrix latifolia Presl, Rel. Haenk. **1**: 316. 1830 (not *G. latifolia* Schult. 1827), upon which is based *Gymnothrix preslii* Kunth (Rév. Gram. **1**: Suppl. XII, 1830; Enum. Pl **1**: 160. 1832) and *Pennisetum preslii* Trin. (in Steud. Nom. Bot. ed. 2. **2**: 298. 1841), may be the same as *Pennisetum bambusiforme*. If so, *P. preslii* is the tenable name. The description was drawn from a fragmentary specimen from the mountains of Huánuco, Peru. The species is differentiated from *P. tristachyum* principally by a sterile lemma longer than the fertile floret. In both *P. tristachyum* and *P. bambusiforme*

the sterile lemma is the longer, but in the latter the difference is greater. In this species, however, the lower floret, which Presl refers to as the "neuter floret" is staminate, or at least the palea is well developed. In *P. tristachyum* the lower floret is empty, a true "neuter floret." The type was not found in the Presl Herbarium at Prague when examined by A. S. Hitchcock in 1907.

PENNISETUM TRISTACHYON var. RUIZIANA Leeke, Zeitschr. Naturw. 79: 33. 1907. "Ecuador." This is distinguished from *P. tristachym* by long-pilose nodes and leaves. Probably an exceptional specimen of *P. tristachyum*.

106. CENCHRUS. L. SANDBUR

Spikelets 1 to 4 together, subtended and surrounded by a spiny bur formed of adnate sterile branches, the burs subsessile along a common axis, falling with the spikelets and permanently inclosing them; spikelets acuminate, the first glume sometimes obsolete.

Plants perennial; involucral lobes united at the base only. Spikes dense. **1. C. myosuroides.**

Plants annual; involucral lobes united above the base.

Involucre with flattened spreading spines, no ring of slender bristles at base.

Burs short-pubescent ---- **2. C. pauciflorus.**

Burs densely villous ---- **3. C. humilis.**

Involucre with a ring of slender bristles at base.

Bristles antrorsely scabrous ---- **7. C. pilosus.**

Bristles retrorsely barbed.

Burs, excluding the bristles, not more than 4 mm. wide, numerous, crowded in a long spike; lobes of involucre interlocking, not spinelike ---- **6. C. viridis.**

Burs, excluding the bristles, 5 to 7 mm. wide, not densely crowded; lobes of the involucre erect or nearly so or rarely one or two lobes interlocking, the tips spinelike.

Foliage glabrous ---- **4. C. echinatus.**

Foliage pubescent ---- **5. C. hillebrandianus.**

1. Cenchrus myosuroides H. B. K. Nov. Gen. & Sp. 1: 115. *pl. 35*. 1816.

Glabrous; culms sparingly branching, woody, often 2 meters tall; spikes dense, cylindric, 12 to 20 cm. long, about 8 mm. thick, the erect involucral bristles not exceeding the spikelet.

Sandy soil, southern United States to Ecuador and Argentina. Originally described from Cuba.

ECUADOR: Riobamba, *Mille* 314. Guachalá, *Sodiro* 13.

PERU: Callao, *Wilkes Expl. Exped.; Cuming* 1063 (Kew Herb.). Chosica, *Macbride & Featherstone* 540.

BOLIVIA: Quiabaya, *Mandon* 1266 (Kew Herb.). Base of Mount Illimani, *Julio* 12. Cochabamba, *Hitchcock* 22806. Cotaña, *Buchtien* 3132. Espía, *White* 604. Tarija, *Fries* 1103.

2. Cenchrus pauciflorus Benth. Bot. Voy. Sulph. 56. 1840.

Cenchrus muricatus R. A. Phil. Anal. Univ. Chile 36: 202. 1870. Not *C. muricatus* L. 1771.

Decumbent, freely branching at the base, the flowering culms ascending; sheaths loose; blades firm, commonly folded; spikes short-exserted, of 6 to 12 burs.

Sandy soil, throughout the United States, south to Argentina. Originally described from Lower California.

PERU: La Merced, *Hitchcock* 22134. Colonia Perené, *Hitchcock* 22110.

BOLIVIA: Mapiri, *Buchtien* 1178.

This species has been referred by many authors to *Cenchrus tribuloides* L.

3. Cenchrus humilis Hitchc., sp. nov.

Annual; culms branching at base, ascending, mostly 2 to 5 cm. tall, sometimes as much as 10 cm., glabrous or pilose below the inflorescence; sheaths minutely puberulent, keeled, pilose along the margin near the summit; ligule a line of very short hairs; blades flat or folded, about as wide as the sheath at the base, gradually narrowed to an acuminate point, 2 to 5 cm. long, 1 to 2 mm. wide, glabrous, minutely scabrous; inflorescence of 1 to 3 burs, sometimes as many as 6; burs crowded, densely villous, about 3 mm. wide (excluding spines), the base obconic, about 1 mm. long, nearly glabrous; lobes of involucre flat, purplish, densely white-villous, the spreading tip 1 to 2 mm. long, triangular-pointed but not extended into a subulate, retrorsely barbed point as in allied species, the lower spines smaller with a few short slender ones intermixed; spikelets 2 in each bur, 5 mm. long, acuminate; first glume ovate-acuminate, 1-nerved, 3 mm. long; second glume a little shorter than the spikelet, 5-nerved, slightly pubescent with scattered short hairs; sterile lemma about as long as the fertile lemma, scaberulous toward apex, 5-nerved, without stamens, the palea narrow, short or nearly as long as the lemma; fertile lemma faintly 5-nerved toward apex, scaberulous or puberulent on the upper part; palea nearly as large as the lemma; caryopsis free, oblong, compressed, obtuse, 2.5 mm. long.

Type in the U. S. National Herbarium, no. 1,163,875, collected on dry sand, about two kilometers east of Mollendo, Peru, November 17, by A. S. Hitchcock (no. 22349).

The only other specimen seen is *Weberbauer* 1490, also from Mollendo.

4. Cenchrus echinatus L. Sp. Pl. 1050. 1753.

Cenchrus pungens H. B. K. Nov. Gen. & Sp. 1: 115. 1816. (Guayaquil, *Bonpland*).

Cenchrus lechleri Steud.; Lechl. Berb. Amer. Austr. 56. 1857, name only. (*Lechler* 1545.)

Culms usually about 50 cm. long, ascending from a decumbent base, branching below; blades flat, thin, usually elongate, 5 to 10 mm. wide; spike commonly 5 to 7 cm. long.

Open ground and waste places. A common weed throughout the warmer parts of America. Originally described from Jamaica and Curaçao.

ECUADOR: Pomasqui, *André* 3789; *Jameson* 245 (Kew Herb.). Riobamba, *Mille* 56; *Spruce* 5818 (Kew Herb.). Baños, *Heilborn* 342. Ambato, *Hitchcock* 21715. Huigra, *Hitchcock* 20360.

PERU: Chosica, *Macbride & Featherstone* 549.

BOLIVIA: Coripata, *Hitchcock* 22688. Milluhuaya, *Buchtien* 4171. Buena Vista, *Steinbach* 5576 (apparently perennial), 6838.

5. Cenchrus hillebrandianus Hitchc. Mem. Bishop Mus. **8:** 211. *f. 106.* 1922.

Resembling *C. echinatus* but the foliage pubescent.

Open ground and sandy soil, Peru and islands of the Pacific Ocean. Originally described from the Hawaiian Islands.

PERU: Callao, *Didrichsen* 4393. La Merced, *Hitchcock* 22133. Colonia Perené, *Hitchcock* 22081. Lima, *Ball* in 1882; *Nation* in 1862 (both Kew Herb.)

6. Cenchrus viridis Spreng. Syst. Veg. 1: 301. 1825.

Taller than *C. echinatus*, more upright, the spikes commonly 10 cm. long, the burs smaller and closer together.

Open ground and waste places, Florida to Brazil and Bolivia. Originally described from Guadeloupe.

ECUADOR: Panigón Plantation, *Hitchcock* 20596, Milagro, *Hitchcock* 20188.

BOLIVIA: Guanay, *Rusby* 190.

7. Cenchrus pilosus H. B. K. Nov. Gen. & Sp. 1: 116. *pl. 36*. 1816.

Cenchrus pallidus Fourn. Mex. Pl. 2: 50. 1886.

A spreading, rather stout annual similar to *C. echinatus*, but usually decumbent and rooting at the lower nodes; burs larger than those of *C. echinatus*, the bristles antrorsely scabrous, the inner twice as long as the body of the bur.

Open ground and cultivated soil, Mexico to Ecuador. Originally described from Venezuela.

ECUADOR: Chanduy, *Spruce* (Kew Herb.).

The Chanduy specimen is more pilose on the inner spines than most of the specimens from Central America (*C. pallidus*), in which it is similar to the specimens from Venezuela, Colombia, and Curaçao, and one specimen from Mexico (Tomellín, *Hitchcock* 6217). The plate cited above is very poor.

107. OLYRA L.

Plants monoecious; inflorescence paniculate; pistillate spikelets borne on the ends of the branches of loose terminal panicles, the smaller staminate spikelets pedicellate below the pistillate ones, sometimes the upper branches all pistillate and the lower ones all staminate; pistillate spikelets rather large; first glume wanting; second glume and sterile lemma herbaceous, often caudate-acuminate; fruit bony-indurate; staminate spikelets readily deciduous; glumes and sterile lemma wanting, the lemma and palea membranaceous.

Panicles ovoid, few-flowered, less than 3 cm. long; pistillate spikelets less than 3 mm. long ..... 1. O. lateralis.

Panicles, at least the primary, much more than 10 cm. long, many-flowered; pistillate spikelets more than 5 mm. long.

Spikelets short-pediceled along the subdigitate main branches of the inflorescence, the numerous staminate below, a few pistillate toward the end, the branches 10 cm. or more long.

Pistillate spikelets 7 to 8 mm. long, acuminate but not caudate. ..... 2. O. ecaudata.

Pistillate spikelets long-caudate, including the point 2 to 4 cm. long.

Staminate spikelets 7 to 10 mm. long; fruit glabrous but delicately pitted ..... 3. O. heliconia.

Staminate spikelets 4 to 5 mm. long; fruit not pitted, glabrous.

Fruit about 1 cm. long; second glume and sterile lemma extending about 1 cm. beyond the fruit ..... 4. O. buchtienii.

Fruit 6 to 7 mm. long; second glume and sterile lemma extending about 3 cm. beyond the fruit ..... 5. O. caudata.

Spikelets in a narrow or open panicle, the branches not subdigitate.

Fruit pubescent ..... 6. O. ciliatifolia.

Fruit glabrous.

Fruit pitted, about 3 mm. long ..... 7. O. micrantha.

Fruit not pitted ..... 8. O. latifolia.

1. Olyra lateralis (Presl) Chase, Proc. Biol. Soc. Washington **21**: 179. 1908.

Panicum laterale Presl, Rel. Haenk. 1: 305. 1830.

A branching straggling perennial, more delicate than the other species; blades oblong, lanceolate, mostly 3 to 4 cm. long, 5 to 10 mm. wide, glaucous beneath; panicles delicate, about 2 cm. long and about as wide; staminate spikelets linear, 3 to 4 mm. long; pistillate spikelets ovoid, 2 to 3 mm. long, at the periphery of the panicle.

Copses and shady banks, Costa Rica to Bolivia. Originally described from the mountains of Huánuco, Peru. (*Haenke.*)

PERU: Hacienda Villcabamba, *Macbride* 4990. Without locality, *Pöppig* 976.

BOLIVIA: Hacienda Simaco, *Buchtien* 5333.

2. Olyra ecaudata Doell in Mart. Fl. Bras. **2**[2]: 326. 1877.

An erect slender perennial about 60 cm. tall, with oblong blades 10 to 20 cm. long, rough above; branches of the inflorescence fascicled, the staminate spikelets short-pediceled along the main branches, the pistillate toward the end, acuminate but not caudate.

French Guiana, whence originally described, to Bolivia.

BOLIVIA: Cobija, *Ule* 9146.

3. Olyra heliconia Lindm. Svensk. Vet. Akad. Handl. **34**[6]: 11. *pl. 6.* 1900.

Culms robust but not much branched, 1 to 2 meters tall; blades asymmetrically truncate at base, as much as 30 cm. long and 8 cm. wide; branches of the inflorescence aggregate in about 1 to 2 whorls, slender, as much as 20 cm. long; staminate spikelets often purple, 1 cm. long, pistillate spikelets mostly 3 or 4 toward the end, caudate, the fruit glabrous, delicately pitted.

Shrubby banks, Brazil, whence originally described, to Bolivia and Peru.

PERU: Santa Ana, *Cook & Gilbert* 1653. Colonia Perené, *Hitchcock* 22056, 22070. Pozuzo, *Macbride* 4572. Lamas, *Spruce* 4807 (Kew Herb.).

BOLIVIA: Coroico, *Hitchcock* 22720; *Buchtien* 450 (Kew Herb.), 3622. Yungas, *Bang* 508. Antahuacana, *Buchtien* 6433.

4. Olyra buchtienii Hack. Repert. Nov. Sp. Fedde **11**: 20. 1912.

Blades oblong-lanceolate, 25 cm. long, 7 cm. wide, glabrous; branches of the inflorescence about 3, digitate, 10 cm. long; staminate spikelets numerous, about 4 mm. long; pistillate spikelets few at the ends of the branches, the glume and sterile lemma acuminate, about 2 cm. long, puberulent within, the fruit smooth.

Known only from the type collection.

BOLIVIA: Mapiri, *Buchtien* 1157.

5. Olyra caudata Trin. Linnaea **10**: 292. 1836.

Blades oblong, 20 cm. long, 8 cm. wide, glabrous; branches of the inflorescence subdigitate, 10 cm. long, the pistillate spikelets solitary at the ends, the glumes extended into a slender point as much as 3 cm. long, the fruit very white and smooth.

Dense forest, Peru to Guiana. Originally described from northern Peru.

PERU: Tocache, *Pöppig* (a fragment from the type specimen in the Trinius Herbarium).

6. Olyra ciliatifolia Raddi, Agrost. Bras. 19. 1823.

Mostly less than 1 meter tall; blades light green, asymmetrically truncate at base, triangular-ovate, 5 to 10 cm. long, 3 to 4 cm. wide; panicle rather delicate, ovoid, about 10 cm. long, the lower branches several in a whorl, again branched once or twice, the upper branches single or in pairs; staminate spikelets about 7 mm. long, acuminate; pistillate spikelets about 1 cm. long, the glume extending about 1 cm. further as a slender point; fruit pubescent.

Rich wood borders, Brazil, whence originally described, to Bolivia and Paraguay.

BOLIVIA: Lake Rogagua, *Rusby* (*Mulford Biol. Expl.*) 1669.

7. Olyra micrantha H. B. K. Nov. Gen. & Sp. 1: 199. 1816.

Growing to the height of 3 to 5 meters, the blades as much as 30 cm. long and 10 cm. wide, rounded but scarcely cordate at base, the panicles as much as 30 cm. long; fruits pitted, 3 mm. long.

Rich woods, Colombia, whence originally described, to Paraguay and Peru.

PERU: Colonia Perené, *Hitchcock* 22060. San Gaván, *Lechler* 3235, 3305 (both Kew Herb.).

BOLIVIA: Mapiri, *Buchtien* 1158.

8. Olyra latifolia L. Syst. Nat. ed. 10. 2: 1261. 1759.

Olyra arundinacea H. B. K. Nov. Gen. & Sp. 1: 197. 1816.

A glabrous perennial, bamboolike in aspect, commonly 5 meters tall, with flat, firm, asymmetrically lanceolate-oblong, abruptly acuminate blades commonly 20 cm. long and 5 cm. wide, and ovoid panicles 10 to 15 cm. long, the branches stiffly ascending or spreading, each bearing a single large long-acuminate pistillate spikelet at the thickened summit and several small slender-pediceled staminate spikelets along the branches.

Copses and shady banks, Mexico and West Indies to Brazil and Bolivia. Originally described from Jamaica.

ECUADOR: El Recreo, *Eggers* 15068. Guayaquil, *Hitchcock* 19962. Balao, *Eggers* 14407, 14669. Portovelo, *Holway* 1002. Between Santa Rosa and La Chorita, *Hitchcock* 21126, 21134.

PERU: La Merced, *Macbride* 5521.

BOLIVIA: Mapiri, *Buchtien* 1155; *Rusby* 209. Reyes, *White* 1210.

OLYRA LORETENSIS Mez, Notizbl. Bot. Gart. Berlin 7: 47. 1917. Described from Leticia, in territory in dispute between Peru, Colombia, and Brazil, the type being *Ule* 6224. It is allied to *O. ciliatifolia* but differs in having much smaller staminate spikelets.

108. RADDIA Bertol.

Plants monoecious; staminate and pistillate spikelets in distinct small panicles, the staminate terminal or from the upper nodes, the pistillate axillary; first glume of the pistillate spikelets wanting, the second glume and sterile lemma membranaceous, acuminate; fruit dorsally subcompressed, narrow, bony-indurate.

1. Raddia capillata (Trin.) Hitchc.

Olyra capillata Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 1: 114. 1834.

Plants rather slender and low; blades thin, glaucescent, 8 to 10 cm. long, 2 cm. wide; fruit slender, smooth, white, 9 mm. long, 1 mm. wide.

Copses and banks, Brazil, whence originally described, to Ecuador.

ECUADOR: Between Portovelo and El Tambo, *Hitchcock* 21280.

109. IMPERATA Cyrillo

Spikelets all perfect, awnless; all pedicellate, articulate below the glumes, the rachis not disjointing, the slender racemes in a narrow spikelike panicle; glumes membranaceous, densely clothed with long silky hairs.

Panicle rarely over 10 cm. long. Spikelets 4 mm. long_____1. **I. brasiliensis.**
Panicle and blades elongate.

Blades involute----2. I. tenuis.
Blades flat.
Spikelets 3 mm. long----3. I. contracta.
Spikelets 2 mm. long----4. I. minutiflora.

1. **Imperata brasiliensis** Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 2: 331. 1832.

Imperata arundinacea var. *americana* Anderss. Öfv. Svensk. Vet. Akad. Förh. 12: 160. 1855.

An erect tufted perennial with scaly rhizomes, the flat leaves mostly clustered toward the base, the slender, simple, nearly naked culm 0.5 to 1 meter tall.

Open, rather dry ground at low altitudes, Mexico to Argentina and Chile. Originally described from Brazil.

ECUADOR: Between Portovelo and El Tambo, *Hitchcock* 21262, 21288.

BOLIVIA: Reyes, *White* 1535.

2. **Imperata tenuis** Hack. in DC. Monogr. Phan. 6: 689. 1889.

Imperata exaltata var. *angustifolia* Hack. in DC. Monogr. Phan. 6: 99. 1889. (*Spruce* 4224.)

A tall stout erect cespitose perennial, with firm stiff involute blades (some of the upper sometimes flat), and dense silvery spikelike panicles 15 to 20 cm. long.

Grassy savannas, Brazil, whence originally described, to Paraguay and Bolivia.

PERU: Tarapoto, *Spruce* 4224.

BOLIVIA: Buena Vista, *Steinbach* 6885, 6928.

3. **Imperata contracta** (H. B. K.) Hitchc. Rep. Mo. Bot. Gard. 4: 146. 1893.[a]

Saccharum contractum H. B. K. Nov. Gen. & Sp. 1: 182. 1816.

Imperata caudata Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 2: 331. 1832.

Imperata exaltata var. *caudata* Hack. in DC. Monogr. Phan. 6: 99. 1889.

Taller than the preceding, the culms leafy, the panicle as much as 40 cm. long.

Swamps and moist open ground, West Indies to Brazil and Peru. Originally described from Colombia.

ECUADOR: Panigón Plantation, *Hitchcock* 20560. Teresita, *Hitchcock* 20499. Naranjito, *Mille* 297.

PERU: Santa Ana, *Cook & Gilbert* 1533.

4. **Imperata minutiflora** Hack. in DC. Monogr. Phan. 6: 100. 1889.

Differing from *I. contracta* in the narrower blades and smaller (2 mm. long) spikelets.

Sandy river banks, Peru and Bolivia. Originally described from Lima.

PERU: Lima, *Wilkes Expl. Exped.; Ball* in 1882 (Kew Herb.).

BOLIVIA: Tarija, *Fries* 1229. Covendo, *White* 983. Río Guendá, *Steinbach* 6894.

110. SACCHARUM L.

Spikelets all perfect, awnless, a ring of long silky spreading hairs at the base of each, one of the pair sessile; rachis articulate, the slender racemes arranged in a large panicle.

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[a] By error this appears as *I. constricta* in the Index Kewensis (Suppl. 1: 222. 1903).

1. **Saccharum officinarum** L. Sp. Pl. 54. 1753. SUGARCANE.

Saccharum infirmum Steud.; Lechl. Berb. Amer. Austr. 56. 1857, name only. (*Lechler* 2148.)

Gigantic perennials with broad leaves, the overlapping sheaths falling from the short-jointed lower part of the culms, the great plumy panicles pinkish silvery; forming seed sparingly.

Cultivated in tropical and subtropical countries of both hemispheres. Originally described from India. The Spanish name is "caña de azúcar."

PERU: San Gaván, *Lechler* 2148, cultivated.

BOLIVIA: Espíritu Santo, *Buchtien* 2514, stated to be growing wild on river banks.

111. ERIOCHRYSIS Beauv.

Spikelets awnless, the sessile spikelets perfect, the pedicellate spikelets pistillate, smaller but fruitful, readily falling, the rachis rather tardily disjointing; racemes short, crowded in a narrow interrupted sometimes spikelike panicle; spikelets long-villous at base.

Blades velvety; panicle dense, golden brown_____1. E. cayennensis.
Blades not velvety; panicle rather loose (when dry), pale or tawny.
2. E. warmingiana.

1. **Eriochrysis cayennensis** Beauv. Ess. Agrost. 8. *pl. 4. f. 11.* 1812.

An erect unbranched perennial 1 to 2 meters or more tall, the long narrow blades densely velvety, the compact, silky, golden brown panicle 10 to 12 cm. long. The so-called pistillate spikelets are cleistogamous, containing small anthers that remain included.

Moist slopes and savannas, southern Mexico and the West Indies to Uruguay. The type locality is presumably Cayenne, French Guiana, though no locality is mentioned in the original description.

BOLIVIA: Río Piray, *Herzog* 1413. Buena Vista, *Steinbach* 5174, 6915. Reyes, *White* 1533.

2. **Eriochrysis warmingiana** (Hack.) Kuhlm. Comm. Linhas Telegraph Estrat. Matto Grosso 67: 29. 1922.

Saccharum warmingianum Hack. in Mart. Fl. Bras. 2[3]: 254. *pl. 60.* 1883.

An erect cespitose perennial about 1 meter tall, with bearded nodes, narrow, loosely involute blades, and a narrow interrupted panicle about 15 cm. long, the racemes 1 to 2 cm. long, overlapping; spikelets 4 mm. long, acutish, the first glume villous toward the tip.

Grassy plains, Brazil, whence originally described, to Paraguay and Bolivia.

BOLIVIA: Buena Vista, *Steinbach* 7032.

112. ERIANTHUS Michx.

Spikelets all perfect, awned, woolly; rachis disarticulating; racemes arranged in a large dense panicle.

Anthers scarcely 1 mm. long (usually remaining in the spikelet after anthesis); panicle pale, mostly more than 30 cm. long, included at base in the somewhat inflated upper sheath; blades mostly more than 1 cm. wide____1. E. trinii.
Anthers 2 to 2.5 mm. long; panicle less than 30 cm. long, finally exserted from the scarcely inflated sheath, the spikelets often purplish; blades mostly less than 1 cm. wide_____2. E. angustifolius.

1. **Erianthus trinii** (Hack.) Hack. in DC. Monogr. Phan. 6: 135. 1889.

Erianthus saccharoides var. *trinii* Hack. in Mart. Fl. Bras. 2[3]: 258. 1883.

A stout perennial 2 to 3 meters tall, with appressed-pubescent sheaths, densely appressed-hispid nodes, and flat pubescent or scabrous blades 1.5

cm. wide; panicle 30 to 40 cm. long, dense, tawny, inclosed in the inflated sheath until maturity, the culm below the panicle densely pubescent; spikelets hidden by the abundant callus hairs, cleistogamous.

Low open ground, Colombia to Brazil and Paraguay. Originally described from Brazil.

BOLIVIA: Coripata, *Hitchcock* 22682.

2. **Erianthus angustifolius** Nees, Agrost. Bras. 316. 1829.

Erianthus saccharoides subsp. *angustifolius* Hack. in Mart. Fl. Bras. 2^3: 258. 1883.

Erianthus saccharoides subsp. *biaristatus* Hack. in Mart. Fl. Bras. 2^3: 258. 1883.

A slender perennial about 1 meter tall, with narrow, elongate, scabrous or pubescent blades 4 to 8 mm. wide, and rather narrow, tawny or purplish panicle mostly 15 to 25 cm. long; spikelets 6 to 7 mm. long, the callus hairs about as long, not so dense as in *E. trinii;* awn straight, 5 to 10 mm. long.

Moist open ground, Brazil to Bolivia and Paraguay. Originally described from southern Brazil.

BOLIVIA: San José, *Hitchcock* 22737. Reyes, *White* 1208.

In White's no. 1208 some of the spikelets are 2-awned, the second awn arising from the sterile lemma, the specimen thus being referable to Hackel's subspecies *biaristatus.*

113. ANDROPOGON L.

Sessile spikelet perfect, usually awned; pedicellate spikelet staminate or neuter; rachis articulate; racemes solitary, digitate, or approximate along a continuous main axis.

Racemes solitary at the ends of the culms or branches, from bractlike sheaths; rachis joints clavate, the summit with a cuplike hollow. (Subgenus SCHIZACHYRIUM.)

Plants annual; culms weak, decumbent ---- 1. A. brevifolius.

Plants perennial; culms mostly erect, often stout.

Rachis conspicuously flexuous, very slender, the spikelets spreading. ---- 2. A. condensatus.

Rachis straight, the spikelets appressed or narrowly ascending.

Spikelets awnless; racemes 1 to 2 cm. long, partly inclosed in the subtending spathe, numerous, aggregate in a narrow panicle. ---- 3. A. virgatus.

Spikelets awned; racemes more than 2 cm. long.

First glume of sessile spikelet villous ---- 4. A. hirtiflorus.

First glume of sessile spikelet glabrous or nearly so.

Rachis joints glabrous ---- 6. A. semiberbis.

Rachis joints ciliate on one side.

Sessile spikelet about 4 mm. long, 1 mm. wide ---- 7. A. tener.

Sessile spikelet 5 to 6 mm. long ---- 5. A. cirratus.

Racemes 2 or more together at the ends of the culms or branches; rachis joints not clavate with hollowed summits.

Racemes numerous or several along an axis, forming an exserted panicle.

Spikelets awnless ---- 9. A. hassleri.

Spikelets awned.

Panicle mostly less than 10 cm. long, silvery white, culms mostly not more than 1 meter tall ---- 8. A. saccharoides.

Panicle 10 to 20 cm. long, greenish rather than silvery white; culms 1.5 to 2 meters tall, mostly solitary ---- 10. A. altus.

Racemes 2 to 4 (rarely 5 or 6), fascicled at the ends of slender branches, subtended by a bladeless sheath (spathe), exserted or partially included, the fascicles usually numerous.

Spikelets awnless.

Plants robust, 1 to 2 meters tall; spathes aggregate in a corymbose, usually dense inflorescence----------11. A. bicornis.

Plants slender, usually less than 1 meter tall; spathes not aggregate.

Sessile spikelets about 3 mm. long; blades usually not more than 2 mm. wide, the apex acuminate----------12. A. leucostachyus.

Sessile spikelets about 4 mm. long; blades 3 to 5 mm. wide, the apex boat-shaped----------13. A. selloanus.

Spikelets awned.

Sessile spikelet 4 to 5 mm. long.

Pedicellate spikelet as large as the sessile one----------14. A. lateralis.

Pedicellate spikelet reduced----------15. A. aequatoriensis.

Sessile spikelet 6 mm. long----------16. A. glaucescens.

1. **Andropogon brevifolius** Swartz, Prodr. Veg. Ind. Occ. 26. 1788.

A slender, trailing or reclining, glabrous, branching annual, with flat obtuse spreading blades and delicate racemes with small spikelets, the awns about 8 mm. long.

Moist banks, tropical regions of both hemispheres. Originally described from Jamaica.

ECUADOR: Panigón Plantation, *Hitchcock* 20566. Huigra, *Hitchcock* 20767.

PERU: Colonia Perené, *Hitchcock* 22113.

2. **Andropogon condensatus** H. B. K. Nov. Gen. & Sp. 1: 188. 1816.

Cymbopogon condensatus Spreng. Syst. Veg. 1: 289. 1825.

Andropogon benthamianus Steud. Syn. Pl. Glum. 1: 382. 1854. (*Hartweg* 1460.)

Andropogon lechleri Steud.; Hack. in Mart. Fl. Bras. 2[3]: 297. 1883. (*Lechler* 1860.)

A tall robust tufted perennial with compressed culms, repeatedly branching toward the summit, forming a large corymbose mass of racemes with very flexuous rachises and delicate awns about 12 mm. long. On dry or rocky slopes the plants may be only 30 cm. tall, while under favorable conditions they may be more than 1 meter in height.

Open, rather dry ground, eastern Mexico and the southern West Indies to Argentina. Originally described from Colombia.

ECUADOR: Quito, *Harteman* 64a, 81. Baños, *Hitchcock* 21911 (small form); *Holmgren* 332; *Tate* 601. Portovelo, *Hitchcock* 21278. Perucho, *Hartweg* 1459 (Kew Herb.); 1460 (Kew Herb.), panicles much condensed.

PERU: Huánuco, *Macbride* 3518. Colonia Perené, *Hitchcock* 22077. San Miguel, *Cook & Gilbert* 1132. Tabina, *Lechler* 1860. Quebrada of Pariahuanca, *Mathews* 935 (Kew Herb.). Without locality, *Pöppig* 966.

BOLIVIA: Chulumani, *Hitchcock* 22656, 22707; *Buchtien* 2551. La Florida, *Hitchcock* 22618, 22636, 22637, 22639; *Holway* 679. Yanacachi, *Buchtien* 434. Villa Aspiazu, *Holway* 686½. Coroico, *Buchtien* 6447. Milluhuaya, *Buchtien* 4261. Yungas, *Bang* 276. Mapiri, *Buchtien* 1151. Espíritu Santo, *Buchtien* 6448. Buena Vista, *Steinbach* 6809, 6950, 6951, 6952, 6953. Without locality, *Mulford Biol. Expl.* 298.

3. Andropogon virgatus Desv.; Hamilt. Prodr. Pl. Ind. Occ. 9. 1825.

Andropogon spathiflorus Kunth, Enum. Pl. 1: 496. 1833.

A tall glabrous tufted perennial with compressed rigid culms, long linear blades, and elongate panicles of small glabrous racemes partly inclosed in rufous or purplish spathes.

Wet sandy open swamps or savannas, West Indies and Central America to Paraguay. Originally described from the "Antilles."

BOLIVIA: Ixiamas, *White* 1124. Buena Vista, *Steinbach* 5344, 6945.

4. Andropogon hirtiflorus (Nees) Kunth, Rév. Gram. 2: 569. 1832.

Schizachyrium hirtiflorus Nees, Agrost. Bras. 334. 1829.

Andropogon tabina Steud.; Lechl. Berb. Amer. Austr. 56. 1857, name only. (*Lechler* 1930.)

Schizachyrium weberbaueri Pilger, Notizbl. Bot. Gart. Berlin 8: 452. 1923. (Caraz, *Weberbauer* 3017.)

Schizachyrium weberbaueri var. *minus* Pilger, Notizbl. Bot. Gart. Berlin 8: 453. 1923. (Prov. Hualgayoc, *Weberbauer* 3949; Tarma, *Weberbauer* 2384.)

A tall slender erect tufted flat-stemmed perennial, with long narrow flat blades and erect short-villous racemes, the twisted awns about 1 cm. long.

Rocky or gravelly hills or flats, Florida, through the West Indies to Paraguay. Originally described from Brazil.

ECUADOR: Quito, *Mille* 296; *Sodiro* in 1887; *Harteman* 63; *Holway* 876. Huigra, *Hitchcock* 20766. Between Loja and San Lucas, *Hitchcock* 21489. Huataxi, *Spruce* 6099 (Kew Herb.).

PERU: Mito, *Macbride* 3325. Río Blanco. *Macbride & Featherstone* 994. Tarma, *Hitchcock* 22147. Tabina, *Lechler* 1930.

BOLIVIA: Sorata, *Mandon* 1384, 1385 (Kew Herb.). Hacienda Anacuri, *Holway* 713. Chulumani, *Hitchcock* 22658. Hacienda Casana, *Buchtien* 7134. Tres Cruces, *Herzog* 1702.

5. Andropogon cirratus Hack. Flora 68: 119. 1885.

Resembling *A. hirtiflorus* but the racemes more slender, and the first glume of the sessile spikelet glabrous.

Grassy plains and rocky hills, southwestern United States and Mexico; Ecuador and Peru. Originally described from New Mexico.

ECUADOR: Huigra, *Hitchcock* 20626. Baños, *Hitchcock* 21915. Huataxi, *Spruce* 6099 (Kew Herb.).

PERU: Ollantaytambo, *Hitchcock* 22526. Mito, *Macbride & Featherstone* 1423.

BOLIVIA: Tarija, *Fiebrig* 2787 (Kew Herb.).

6. Andropogon semiberbis (Nees) Kunth, Enum. Pl. 1: 496. 1833.

Schizachyrium semiberbe Nees, Agrost. Bras. 336. 1829.

Similar to *A. hirtiflorus*, stouter, taller, often glaucous; blades up to 5 mm. wide; racemes numerous toward the summit of the culm.

Grassy hills and savannas, Florida, through the West Indies to Brazil. Originally described from Brazil.

ECUADOR: Portovelo, *Hitchcock* 21261, 21271. Between Portovelo and El Tambo, *Hitchcock* 21313.

7. Andropogon tener (Nees) Kunth, Rév. Gram. 2: 565. 1832.

Schizachyrium tenerum Nees, Agrost. Bras. 336. 1829.

Andropogon gracilis Presl, Rel. Haenk. 1: 336. 1830.

Andropogon preslii Kunth, Enum. Pl. 1: 489. 1833.

Similar to *A. hirtiflorus*, densely tufted, more slender, the blades narrower, more or less involute, the numerous slender racemes rarely 5 cm. long.

Grassy hills and rocky cliffs, southern United States to Argentina. Originally described from Brazil.

BOLIVIA: Sorata, *Mandon* 1383 (Kew Herb.). Camacho, *Fiebrig* 2859. Tarija, *Fiebrig* 3154 (Kew Herb.).

8. Andropogon saccharoides Swartz, Prodr. Veg. Ind. Occ. 26. 1788.

SILVER BEARDGRASS

Andropogon kunthii Fourn. Mex. Pl. 2: 58. 1886. (Vicinity of Quito.)

A tall, erect, unbranched perennial with brittle culms, rather firm, long, flat blades, and an oblong pale silky panicle of numerous racemes, the delicate awns 1.5 to 2 cm. long; nodes bearded with stiff white hairs; sessile spikelets about 5 mm. long. The blades may be glabrous or villous.

Rocky hills and grassy slopes, southwestern United States and West Indies to Argentina. Originally described from Jamaica.

BOLIVIA: Cochabamba, *Hitchcock* 22794. La Paz, *Holway* 470.

8a. Andropogon saccharoides laguroides Hack. in Mart. Fl. Bras. 2^3: 293. 1883.

Andropogon laguroides DC. Cat. Hort. Monsp. 78. 1813.

Differs from *A. saccharoides* in having glabrous nodes, usually less robust and lower culms, and smaller panicles.

Grassy plains and slopes, southwestern United States to Argentina. Originally described from Mexico.

ECUADOR: Between Huigra and Naranjapata, *Hitchcock* 20660. Portovelo, *Hitchcock* 21251.

PERU: Mayo River, *Spruce* 4854 (Kew Herb.).

BOLIVIA: Cochabamba, *Hitchcock* 22823; *Herzog* 2070.

8b. Andropogon saccharoides parvispiculus Hitchc., subsp. nov.

Differing from *A. saccharoides* in having a longer, gray or purplish panicle of smaller (3 to 4 mm. long) spikelets; blades pubescent or glabrous.

Type in the U. S. National Herbarium, no. 1,163,461, collected along an irrigation ditch, near Cochabamba, Bolivia, January 5, 1924, by A. S. Hitchcock (no. 22851).

Open ground, cultivated soil, and grassy slopes, Brazil to Argentina and Ecuador.

ECUADOR: Between Malchinguí and Pomasqui, *Hitchcock* 20903. Quito, *Holway* 903; *Sodiro* 298; *Harteman* 24, 60. Ambato, *Hitchcock* 21713. Huigra, *Hitchcock* 20328; *Rose* 22647. Between Huigra and Naranjapata, *Hitchcock* 20653. Quito, *Jameson* 320 (Kew Herb.). Huataxi, *Spruce* 6100 (Kew Herb.).

PERU: Huánuco, *Haenke*. Lima, *Wilkes Expl. Exped.* Tarma, *Hitchcock* 22166. Cuzco, *Hitchcock* 22499.

BOLIVIA: Sorata, *Mandon* 1389. La Florida, *Hitchcock* 22615. La Paz, *Buchtien* 574; *Bang* 102. Cochabamba, *Hitchcock* 22794½, 22851; *Herzog* 2071; *Holway* 392.

This is included by Hackel[43] under *A. saccharoides β barbinodis*, based on *A. barbinodis* Lag. (type from Mexico), but is not the same as Lagasca's species, the latter being the same as *A. saccharoides* Swartz. It appears also to be included in *A. kunthii* Fourn.,[44] which is based on *A. argenteus* as described by Kunth,[45] which Fournier differentiates from the Mexican *A. argenteus*

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[43] DC. Monogr. Phan. 6: 494. 1889.

[44] Mex. Pl. 2: 59. 1886.

[45] H. B. K. Nov. Gen. & Sp. 1: 188. 1816.

DC. (*A. saccharoides* Swartz). Kunth's description, however, based on plants from Ecuador, applies to *A. saccharoides*, while his statement concerning a variety with smaller spikelets probably applies to the subspecies *parvispiculus* described above.

8c. Andropogon saccharoides perforatus (Trin.) Hack. in DC. Monogr. Phan. **6**: 496. 1889.

Andropogon perforatus Trin.; Fourn. Mex. Pl. **2**: 59. 1886.

First glume bearing a small pit or depression on the back above the middle; otherwise resembling *A. saccharoides.*

Plains and hills, Texas to Argentina. Originally described from Mexico.

ECUADOR: Huigra, *Hitchcock* 20616, 20753. Between Huigra and Naranjapata, *Hitchcock* 20655.

PERU: Callao, *Wilkes Expl. Exped.* Chosica, *Holway* 783. Matucana, *Macbride & Featherstone* 255. Tarma, *Hitchcock* 22166½. Tabina, *Lechler* 1952.

BOLIVIA: Cochabamba, *Holway* 325. Comarapa, *Herzog* 1854.

In Mexican Grasses [46] this form was held to be a distinct species. The typical form has more distinctly flabellate panicles, larger spikelets, and more pronounced pits than the Andean specimens.

9. Andropogon hassleri Hack. Bull. Herb. Boiss. II. 4[3]: 266. 1904.

Andropogon saccharoides var. *hassleri* Ekman, Ark. för Bot. **11**[4]: 8. 1912.

Resembling *A. saccharoides laguroides;* culms slender, about 1 meter tall, the nodes glabrous; spikelets awnless; panicle oblong, about 10 cm. long.

Grassy slopes, Paraguay, whence originally described, and Bolivia.

BOLIVIA: Coroico, *Buchtien* 3621. Chulumani, *Hitchcock* 22659.

10. Andropogon altus Hitchc. Contr. U. S. Nat. Herb. **17**: 208. 1913.

Resembling *A. saccharoides;* culms stout, 1 to 2 meters tall, the nodes bearded; panicle oblong, 10 to 25 cm. long, greenish, less villous than usual in *A. saccharoides;* first glume pitted.

Dry slopes and grassy hills, Mexico and Bolivia. Originally described from Mexico.

BOLIVIA: Hacienda Anacuri, *Holway* 709. Milluhuaya, *Buchtien* 4258. Chulumani, *Hitchcock* 22651, 22705.

11. Andropogon bicornis L. Sp. Pl. 1046. 1753.

A tall robust tufted perennial, with long linear blades, scabrous on the margin, and large feathery corymbose inflorescence of delicate racemes, one, sometimes two, of the uppermost pediceled spikelets larger than the fertile ones, the other pediceled spikelets rudimentary.

Grassy hills and banks, southern Mexico to Paraguay. The type is from Jamaica.

ECUADOR: Quito, *Sodiro* 295. Between Huigra and Naranjapata. *Hitchcock* 20677. Portovelo, *Hitchcock* 21274.

PERU: Colonia Perené, *Hitchcock* 22051.

BOLIVIA: Sorata, *Mandon* 1388 (Kew Herb.). Ixiamas, *White* 1126. Mapiri, *Buchtien* 1152. Hacienda Casana, *Buchtien* 7137. Villa Aspiazu, *Holway* 686. Yanacachi, *Buchtien* 412. La Florida, *Hitchcock* 22617. Coroico, *Buchtien* 6446. Milluhuaya, *Buchtien* 4259. Hacienda Simaco, *Buchtien* 5311, 5312. Buena Vista, *Steinbach* 5274, 6949. Without locality, *Cárdenas* (*Mulford Biol. Expl.*) 2143.

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[46] Contr. U. S. Nat. Herb. **17**: 207. 1913.

12. Andropogon leucostachyus H. B. K. Nov. Gen. & Sp. 1: 187. 1816.

Andropogon lanuginosus H. B. K. Nov. Gen. & Sp. 1: 187. 1816.

A slender, densely tufted, erect perennial, the elongate blades with a deeply impressed mid-vein; racemes 2 or 3 on slender exserted peduncles, the spikelets obscured by the copious long silky hairs.

Cliffs and grassy slopes, West Indies and southern Mexico to Ecuador and Uruguay. Originally described from Venezuela.

Ecuador: Portovelo, *Hitchcock* 21263.

Bolivia: Hacienda Casana, *Buchtien* 7136. Coroico, *Buchtien* 3618. Yanacachi, *Buchtien* 411. Buena Vista, *Steinbach* 6845, 6846. Reyes, *Rusby* (*Mulford Biol. Expl.*) 1321. La Florida, *Hitchcock* 22642. Milluhuaya, *Buchtien* 4260.

13. Andropogon selloanus (Hack.) Hack. Bull. Herb. Boiss. II. 4: 266. 1904.

Andropogon leucostachyus var. *selloanus* Hack. in DC. Monogr. Phan. 6: 420. 1889.

Similar to *A. leucostachyus*, stouter, the blades shorter, broader, and with a boat-shaped tip; racemes often 5 or 6, more copiously villous.

Savannas and open ground, West Indies to Peru and Paraguay. Originally described from Brazil.

Peru: Colonia Perené, *Hitchcock* 22096.

Bolivia: Buena Vista, *Steinbach* 5143, 6723, 6874, 6971b.

14. Andropogon lateralis Nees, Agrost. Bras. 329. 1829.

Andropogon incanus var. *lateralis* Hack. in Mart. Fl. Bras. 2³: 288. 1883.

An erect glabrous usually rich purple perennial 60 to 100 cm. tall, with flat blades 3 to 6 mm. wide, and few to several exserted inflorescences of 2 to 4 racemes 3 to 4 cm. long; joint and sterile pedicel villous; sessile spikelet 4 to 5 mm. long, purplish, the awn about 1 cm. long; sterile spikelet about as long as the fertile.

Rocky slopes, Brazil, whence originally described, to Peru and Uruguay.

Peru: Tarma, *Hitchcock* 22143.

Bolivia: Santa Cruz, *Herzog* 1302. Buena Vista, *Steinbach* 5427, 6851.

14a. Andropogon lateralis incanus (Hack.) Henr. Med. Rijks Herb. Leiden 40: 42. 1921.

Andropogon incanus Hack. in DC. Monogr. Phan. 6: 431. 1889.

Differing from *A. lateralis* in having mostly 2, somewhat longer, tawny and more villous racemes.

Grassy hills, Ecuador to Uruguay. Originally described from Brazil.

Ecuador: Baños, *Hitchcock* 21919. Between El Tambo and La Toma, *Hitchcock* 21335.

Peru: Mito, *Macbride & Featherstone* 1499, 1611; *Macbride* 3323. Tarma, *Hitchcock* 22156.

15. Andropogon aequatoriensis Hitchc., sp. nov.

Perennial; culms cespitose, erect, glabrous, about 1 meter tall, branched above; sheaths glabrous; ligule truncate, glabrous, 1 to 2 mm. long, the margin minutely lacerate; blades flat, glabrous, scaberulous on the margin, 15 to 30 cm. long, 3 to 8 mm. wide, gradually narrowed to an involute scabrous tip; fascicles of racemes terminating the numerous slender erect branches, forming a narrow compound inflorescence about one-third as long as the entire plant; peduncles slender, glabrous, 5 to 10 cm. long, finally exserted from the spathes, the spathe tips scarcely inflated; racemes 2 or 3 in a fascicle, somewhat flexuous, 2 to 3 cm. long, mostly unequal in length; joints of rachis about

3 mm. long, slender, long-villous, especially toward the apex, the base, including the callus of the fertile floret, densely short-pilose; sessile floret about 5 mm. long, glabrous; first glume lanceolate-oblong, depressed between the nerves, scabrous on the nerves toward the tip; awn exserted about 5 mm., flexuous; sterile pedicel a little longer than the joint of the rachis and closely resembling it; sterile spikelet reduced to a bract about 1 mm. long.

Type in the U. S. National Herbarium, no. 1,163,457, collected on grassy slopes, between Loja and San Lucas, Ecuador, altitude about 2,500 meters, September 6, 1923, by A. S. Hitchcock (no. 21481).

No other specimen has been seen. The species resembles *A. lateralis*, but in that species the sterile floret is about as large as the fertile one, while in *A. aequatoriensis* it is much reduced.

16. **Andropogon glaucescens** H. B. K. Nov. Gen. & Sp. 1: 186. 1816.

Andropogon amplus Presl, Rel. Haenk. 1: 339. 1830.

Differing from *A. lateralis* in the larger sessile spikelet; first glume 6 mm. long, sulcate on the back, gradually narrowed at the summit.

Grassy slopes, Brazil to Ecuador, whence originally described. (Chillo, *Bonpland.*)

ECUADOR: Chillo, *Sodiro* in 1890. Quito, *Jameson* 316 (Kew Herb.)

ANDROPOGON FLAVESCENS Presl, Rel. Haenk. 1: 339. 1830. In the U. S. National Herbarium there is a fragment of the inflorescence from the type specimen, from Huánuco, Peru, in the National Museum at Prague. It differs from *A. glaucescens* chiefly in the denser fulvous pubescence. No other specimen has been seen.

ANDROPOGON ALTERNANS Presl, Rel. Haenk. 1: 342. 1830. The locality is given as Peru. The type specimen in the herbarium of the German University at Prague is labeled Luzon. It belongs to *Rhaphis parviflora* (R. Br.) Chase (*Andropogon micranthus* Kunth).

114. HYPARRHENIA Anderss.

Racemes in pairs, subtended by spathes, mostly in a compound inflorescence, differing from *Andropogon* in having the lower pair of at least one of the racemes with two similar sterile awnless spikelets, the other pairs consisting of a sessile fertile awned spikelet and a pediceled sterile awnless spikelet, the callus of the fertile spikelet elongate, acute; margins of the first glume of the fertile spikelet involute rather than inflexed and 2-keeled as in *Andropogon;* awn from the sinus of the bifid fertile lemma.

1. **Hyparrhenia bracteata** (Humb. & Bonpl.) Stapf in Prain, Fl. Trop. Afr. 9: 360. 1918.

Andropogon bracteatus Humb. & Bonpl.; Willd. Sp. Pl. 4: 914. 1806.

Anthistiria pilosa Presl, Rel. Haenk. 1: 348. 1830. (Mountains of Huánuco, Peru, *Haenke*).

An erect perennial a meter or more tall, the sheaths more or less hispid, especially near the summit, the blades long and narrow, appressed-hispid beneath, the narrow brown inflorescence commonly 30 cm. or more long; bracts or spathes of the pairs of racemes narrow, 1 to 2 cm. long, the few-flowered racemes mostly less than 1 cm. long, the strongly bent awns about 2 cm. long.

Savannas, southern Mexico to Brazil. Originally described from Venezuela.

ECUADOR: Portovelo, *Hitchcock* 21260, 21314.

PERU: Santa Ana, *Cook & Gilbert* 1638.

BOLIVIA: Chulumani, *Hitchcock* 22704. Ixiamas, *White* 1125. Reyes, *Rusby* 189.

CYMBOPOGON CITRATUS (DC.) Stapf, the lemon grass, is occasionally cultivated in tropical America. It is a robust aromatic perennial with a large compound inflorescence of small awnless or obscurely awned racemes. The essential oil is used in perfumery. A native of Asia. American specimens are all sterile. Santa Ana, Peru, *Cook & Gilbert* 1529 (called "yerba Luisa").

115. HOLCUS L.

Racemes reduced to 1 to 5 joints, borne on slender peduncles on the slender branches of a compound panicle; rachis slender, tardily disjointing; spikelets arranged as in *Andropogon*, the pedicellate spikelet usually staminate, the sessile spikelets awnless or with a deciduous awn.

Plants perennial, with creeping rhizomes.....1. H. halepensis.
Plants annual.....2. H. sorghum.

1. Holcus halepensis L. Sp. Pl. 1047. 1753. JOHNSON GRASS.

Andropogon halepensis Brot. Fl. Lusit. 1: 89. 1804.

Sorghum halepensis Pers. Syn. Pl. 1: 101. 1805.

A robust perennial with numerous stout rhizomes, flat scabrous-margined blades, and a large open panicle of plump spikelets with deciduous awns, or awnless.

A weed in fields and waste places in the warmer parts of America; introduced from the Old World. Originally described from Syria.

PERU: Santa Ana, *Cook & Gilbert* 1428, 1514. Lima, *Hitchcock* 22347 (awnless), 22348 (awned).

2. Holcus sorghum L. Sp. Pl. 1047. 1753. SORGHUM.

Andropogon sorghum Brot. Fl. Lusit. 1: 88. 1804.

Sorghum vulgare Pers. Syn. Pl. 1: 101. 1805.

A large broad-leaved annual, with a compact or open panicle of turgid persistent spikelets.

Widely cultivated in the warmer regions of both hemispheres and sometimes spontaneous. Originally described from India.

BOLIVIA: Coroico, *Buchtien* 3615. Sorata, *Mandon* 1390, cultivated (Kew Herb.).

116. SORGHASTRUM Nash

Racemes arranged as in *Holcus*, the pedicellate spikelet wanting, only the pedicel present; rachis flexuous, readily disjointing.

Awns about 6 cm. long, chestnut brown.....1. S. minarum.
Awns less than 2 cm. long.
  Awn straight or once geniculate, not strongly spirally twisted at base, shorter than the spikelet or sometimes a little longer (5 to 7 mm.)
    2. S. parviflorum.
  Awn twice geniculate, strongly spirally twisted at base, about three times as long as the spikelet.....3. S. stipoides.

1. Sorghastrum minarum (Nees) Hitchc.

Trachypogon minarum Nees, Agrost. Bras. 349. 1829.

Andropogon minarum Kunth, Rév. Gram. 1: Suppl. XL. 1830.

A slender erect perennial about 1 meter tall, with flat blades and spikelike panicles 10 to 15 cm. long, the chestnut-brown awns 6 cm. long, twice-geniculate, tightly twisted below, the fruit resembling that of *Stipa*.

Plains and open grassland, Brazil, whence originally described, to Paraguay and Bolivia.

BOLIVIA: Buena Vista, *Steinbach* 5430, 7028.

2. Sorghastrum parviflorum (Desv.) Hitchc. & Chase, Contr. U. S. Nat. Herb. **18**: 287. 1917.

Sorghum parviflorum Desv.; Hamilt. Prodr. Pl. Ind. Occ. 12. 1825.

Andropogon agrostoides Speg. Anal. Soc. Cienc. Argentina **16**: 136. 1883.

Andropogon nutans var. *submuticus* Hack. in DC. Monogr. Phan. **6**: 529. 1889.

Andropogon nutans var. *agrostoides* Hack. in DC. Monogr. Phan. **6**: 529. 1889.

A tall, erect tufted glabrous perennial, with long, flat, or subinvolute blades and long lanceolate panicles with slender or subcapillary branchlets and peduncles and golden-brown spikelets, the ultimate peduncles, the sterile pedicels, and the base of the spikelet clothed with white hairs; awn rather weak, exserted 5 to 7 mm.

Grassy hillsides, southern Mexico and the West Indies to Argentina. Originally described from Hispaniola.

BOLIVIA: Buena Vista, *Steinbach* 5428, 6984, 7050b. Río Piray, *Herzog* 1656.

3. Sorghastrum stipoides (H. B. K.) Nash, N. Amer. Fl. **17**: 129. 1912.

Andropogon stipoides H. B. K. Nov. Gen. & Sp. **1**: 189. 1816.

Andropogon nutans var. *stipoides* Hack. in DC. Monogr. Phan. **6**: 530. 1889.

More slender than the preceding, the narrower blades convolute, the spikelets slightly larger, and the awns well developed, twice geniculate, exserted 10 to 15 mm.

Grassy hillsides, Cuba to Argentina. Originally described from Colombia.

BOLIVIA: Sorata, *Mandon* 1382 (Kew Herb.). Valle Grande, *Herzog* 1789.

117. HETEROPOGON Pers.

Racemes solitary or fascicled, the lower part of the rachis not disjointing, bearing 2 to 5 pairs of staminate awnless spikelets, the upper part of the rachis disarticulating obliquely at the base of each joint, each forming a sharp callus below the long-awned sessile perfect spikelet, the pedicellate spikelet staminate.

Racemes 2 to 7 (sometimes solitary on the branches)_____1. H. villosus.

Racemes solitary.

Plants perennial, less than 1 meter tall; outer glume of staminate spikelet more or less hispid_____2. H. contortus.

Plants annual, more than 1 meter tall; outer glume of staminate spikelet provided with a row of glands along the back, not pilose.

3. H. melanocarpus.

1. Heteropogon villosus Nees, Agrost. Bras. 362. 1829.

Andropogon neesii Kunth, Rév. Gram. **1**: Suppl. XXXIX. 1830.

Andropogon villosus Ekman, Ark. för Bot. **11**[4]: 9. 1912. Not *A. villosus* Thunb. 1794.

An erect or decumbent-spreading perennial as much as 1 meter tall, with villous nodes, flat blades, and exserted panicles of 2 to several villous subdigitate racemes on slender, drooping or S-shaped peduncles about 1 cm. long; first glume of sessile spikelet rounded on the margins, not keeled; awn stipitiform at base, 3 to 5 cm. long.

Dry plains and grassy slopes, Brazil, whence originally described, to Paraguay and Bolivia.

BOLIVIA: Santa Cruz, *Herzog* 1308.

Hackel[47] places this species in the subgenus *Dichanthium*, but states that it is closely related to the subgenus *Heteropogon* and that if the racemes were always solitary, as they often are on the branches, it would be a true *Heteropo-*

[47] DC. Monogr. Phan. **6**: 581. 1889.

gon. The species resembles *Euclasta condylotricha* (Hochst.) Stapf (*Andropogon piptatherus* Hack.) in the fascicled racemes on nodding peduncles, but in the latter the first glume of the fertile spikelets is compressed dorsally, the edges are sharply inflexed and keeled, and the callus short and obtuse. In *Heteropogon villosus* the first glume of the fertile floret is indurate and little compressed, the edges are rounded and incurved but not keeled, and the callus is long, sharp, and villous, as in the other species of *Heteropogon.*

2. Heteropogon contortus (L.) Beauv.; Roem. & Schult. Syst. Veg. **2**: 836. 1817.

Andropogon contortus L. Sp. Pl. 1045. 1753.

An erect tufted branching perennial, with compressed culms, keeled sheaths, scabrous blades, and solitary 1-sided racemes about 5 cm. long, the strong brown bent awns as long again.

Rocky slopes, warmer parts of both hemispheres. Originally described from India.

ECUADOR: Huigra, *Hitchcock* 20628. Huataxi, *Spruce* 6094 (Kew Herb.).

PERU: Huánuco, *Macbride* 3239.

BOLIVIA: Camataquí, *Fiebrig* 3074. Sorata, *Mandon* 1387 (Kew Herb.). Tarija, *Fries* 1214.

3. Heteropogon melanocarpus (Ell.) Benth. Journ. Linn. Soc. Bot. **19**: 71. 1882.

Andropogon melanocarpus Ell. Bot. S. C. & Ga. **1**: 146. 1816.

A stout, often glaucous annual 1.5 to 2.5 meters tall, with blades as much as 1 cm. wide, and several racemes crowded in the upper leaves, forming a rather dense inflorescence 20 to 30 cm. long.

Grassy slopes and open ground, southern United States to Bolivia, and in the tropical regions of the Old World. Originally described from Georgia.

ECUADOR: Huigra, *Hitchcock* 20329, 20621.

PERU: Tarapoto, *Spruce* 4180 (Kew Herb.).

BOLIVIA: Coripata, *Hitchcock* 22678. Chulumani, *Hitchcock* 22706.

118. TRACHYPOGON Nees

Perfect spikelet awned, pedicellate, the pedicel disjointing obliquely, forming a sharp callus below the spikelet; staminate spikelet subsessile, persistent on the slender continuous rachis; racemes solitary or few to several digitate.

Blades villous ..... **3. T. canescens.**

Blades scabrous.

Racemes solitary, rarely 2, on each culm; awn densely soft pubescent below. **1. T. montufari.**

Racemes 2 or 3, rarely solitary; awn sparsely plumose with long hairs below. **2. T. plumosus.**

1. Trachypogon montufari (H. B. K.) Nees, Agrost. Bras. 342. 1829.

Andropogon montufari H. B. K. Nov. Gen. & Sp. **1**: 184. 1816.

Trachypogon polymorphus var. *montufari* Hack. in Mart. Fl. Bras. **2**^{3}: 264. 1883.

Trachypogon polymorphus var. *bolivianus* Pilger, Bot. Jahrb. Engler **27**: 22. 1899. (*Bang* 1079).

Trachypogon plumosus var. *montufari* Hack.; Henr. Med. Rijks Herb. Leiden **40**: 40. 1921.

A slender erect perennial 50 to 100 cm. tall, with narrow scabrous blades, a firm ligule as much as 1 cm. long, and a single slender dense long-exserted

raceme; first glume pubescent, obtuse; awn of fertile lemma twice geniculate, 3 to 5 cm. long, pubescent but not plumose.

Dry plains and grassy hills, Arizona through Mexico to Uruguay. Originally described from near Quito. (*Bonpland.*)

ECUADOR: Between Loja and San Lucas, *Hitchcock* 21469. Huigra, *Hitchcock* 20752. Quito, *Harteman* 64. Portovelo, *Hitchcock* 21270.

PERU: Tarma, *Hitchcock* 22148. Mito, *Macbride & Featherstone* 1447; *Macbride* 3430.

BOLIVIA: Cochabamba, *Hitchcock* 22831. "Bolivian Plateau," *Bang* 1079. Tres Cruces, *Herzog* 1693. Samaipata, *Herzog* 1705. Buena Vista, *Steinbach* 5379. Camacho, *Fiebrig* 2864 (Kew Herb.).

2. Trachypogon plumosus (Humb. & Bonpl.) Nees, Agrost. Bras. 344. 1829.

Andropogon plumosus Humb. & Bonpl.; Willd. Sp. Pl. **4**: 918. 1806.

Trachypogon polymorphus var. *plumosus* Hack. in Mart. Fl. Bras. **2**^{3}: 265. 1883.

Similar to *T. montufari*, usually taller; racemes 2 or 3, rarely more or only one; awn somewhat plumose.

Dry plains and grassy or rocky slopes, Mexico to Brazil and Bolivia. Originally described from Venezuela.

PERU: Huacachi, *Macbride* 4068.

BOLIVIA: Hacienda Casana, *Buchtien* 7145.

3. Trachypogon canescens Nees, Agrost. Bras. 343. 1829.

Trachypogon polymorphus var. *canescens* Hack. in Mart. Fl. Bras. **2**^{3}: 263. 1883.

Resembling *T. montufari;* blades mostly involute, villous; racemes mostly solitary; awn plumose below.

Grassy plains and rocky slopes, Brazil, whence originally described, to Paraguay and Bolivia.

BOLIVIA: Buena Vista, *Steinbach* 6947.

119. ELYONURUS Humb. & Bonpl.

Spikelets in pairs, one sessile and perfect, the other pedicellate and staminate, both awnless, arranged in a solitary spikelike raceme.

First glume of sessile spikelet entire ..... 1. E. adustus.
First glume of sessile spikelet 2-toothed ..... 2. E. tripsacoides.

1. Elyonurus adustus (Trin.) Ekman, Ark. för Bot. **13**^{10}: 6. 1913.

Andropogon adustus Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. **2**: 259. 1832.

Andropogon latiflorus Nees; Steud. Syn. Pl. Glum. **1**: 364. 1854.

Elyonurus latiflorus Nees; Hack. in Mart. Fl. Bras. **2**^{3}: 307. 1883.

An erect slender perennial 50 to 100 cm. tall, closely cespitose and somewhat bulbous at base, with slender, erect, elongate blades, and a raceme 5 to 10 cm. long, the spikelets villous, about 6 mm. long.

Dry plains and grassy slopes, British Guiana to Argentina. Originally described from Chile and Brazil.

PERU: Tarapoto, *Spruce* 4500 (Kew Herb.).

BOLIVIA: Reyes, *Cárdenas* (*Mulford Biol. Expl.*) 1665. Coroico, *Buchtien* 3619. Hacienda Casana, *Buchtien* 7138. Buena Vista, *Steinbach* 5244, 5404, 6641, 6642, 6875.

2. Elyonurus tripsacoides Humb. & Bonpl.; Willd. Sp. Pl. **4**: 941. 1806.

Elionurus ciliaris H. B. K. Nov. Gen. & Sp. **1**: 193. *pl. 63.* 1816.

Elionurus tripsacoides var. *ciliaris* Hack. DC. Monogr. Phan. **6**: 333. 1889.

Elionurus tripsacoides var. *brevidentatus* Hack. in DC. Monogr. Phan. 6: 334. 1889.

Resembling *E. adustus*, but the first glume 2-toothed. The spikelets may be villous (subsp. *ciliaris*) or only pubescent (subsp. *brevidentatus*). The typical form with glumes glabrous on the back has not been seen from this region.

Dry plains and slopes, Mexico to Argentina. Originally described from Venezuela.

BOLIVIA: Cochabamba, *Herzog* 2126 (*ciliaris*). Camacho, *Fiebrig* 2577. Río Guendá, *Steinbach* 6896.

120. MANISURIS L.

Sessile spikelets perfect, awnless, sunken in hollows in the thickened articulate joints of the rachis, the flat, often rugose, indurate first glume covering the hollow; pedicellate spikelet sterile, the pedicel thickened, appressed, or adnate to the rachis joint; racemes solitary.

Culms creeping and ascending, flattened; racemes compressed. 1. M. fasciculata.

Culms erect, terete; racemes terete 2. M. aurita.

1. **Manisuris fasciculata** (Lam.) Hitchc. Amer. Journ. Bot. 2: 299. 1915.

Rottboellia fasciculata Lam. Tabl. Encycl. 1: 204. 1791.

Culms ascending from a long creeping base, compressed and 2-edged, the blades 10 to 15 cm. long, 3 to 8 mm. wide; racemes axillary, compressed, 3 to 5 or as much as 10 cm. long.

Ponds and ditches, in water or mud, Texas to Argentina; also in the warmer parts of the Old World. Originally described from North Africa; probably introduced in the Western Hemisphere.

ECUADOR: Milagro, *Hitchcock* 20279.

PERU: Chosica, *Macbride & Featherstone* 553.

BOLIVIA: Espía, *White* 627.

2. **Manisuris aurita** (Steud.) Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 276. 1917.

Rottboellia aurita Steud. Syn. Pl. Glum. 1: 361. 1854.

A stout perennial 1 to 1.5 meters tall, the erect branches with numerous slender racemes 6 to 10 cm. long, the first glume marginate and winged above, foveolate or pitted on the back.

Grassy hillsides, Brazil, whence originally described, to Trinidad and Bolivia.

BOLIVIA: Reyes, *White* 1221. Buena Vista, *Steinbach* 6973b.

121. ISCHAEMUM L.

Sessile spikelets perfect, awned; pedicellate spikelets perfect but not always fruitful; rachis disjointing; racemes 2 to several, digitate or fascicled.

1. **Ischaemum latifolium** (Spreng.) Kunth, Rév. Gram. 1: 168. 1829.

Andropogon latifolius Spreng. Syst. Veg. 1: 286. 1825.

A large stout branching annual, geniculate below, with flat glabrous blades up to 20 cm. long and 3 cm. wide, and several rather flexuous racemes in a fan-shaped cluster.

Moist shady places, southern Mexico and the Lesser Antilles to Brazil and Ecuador. Originally described from the West Indies, Guadeloupe and Martinique being mentioned.

ECUADOR: Near Cashurco, *Hitchcock* 21751.

1a. Ischaemum latifolium hirtivaginum Hitchc., subsp. nov.

Differs from *I. latifolium* in having pilose sheaths, the hairs 5 mm. long, yellowish, densely arranged about the nodes and along the back of the sheath, sparsely so along the margins and toward the summit.

Type in the U. S. National Herbarium, no. 1,163,404, collected along trail in tropical forest, near Cashurco, 13 kilometers east of Baños, Ecuador, altitude 1,300 meters, September 25, 1923, by A. S. Hitchcock (no. 21757).

The only other specimen seen is Hitchcock's no. 21755 from the same region as the type. In this the pubescence is less dense.

122. HACKELOCHLOA Kuntze

(*Rytilix* Raf.[48])

Sessile spikelets perfect, the first glume globose, indurate, alveolate, the adnate rachis joint and pedicel fitting into the opening of the glume; pedicellate spikelet relatively large, sterile.

1. Hackelochloa granularis (L.) Kuntze, Rev. Gen. Pl. 2: 776. 1891.

Cenchrus granularis L. Mant. Pl. 575. 1771.

Manisuris granularis Swartz, Prodr. Veg. Ind. Occ. 25. 1788.

Rytilix granularis Skeels, U. S. Dept. Agr. Bur. Pl. Ind. Bull. 282: 20. 1913.

A coarsely hispid, freely branching annual, with flat blades and numerous terminal and axillary racemes 1 to 2.5 cm. long.

A common weed throughout tropical America, introduced from the Old World. Originally described from the East Indies.

ECUADOR: Milagro, *Hitchcock* 20266. Panigón Plantation, *Hitchcock* 20565.

PERU: Colonia Perené, *Hitchcock* 22083. La Merced, *Macbride* 5452.

BOLIVIA: Milluhuaya, *Buchtien* 4189. Reyes, *White* 1215. Sorata, *Bang* 1310. Buena Vista, *Steinbach* 5301. Chulumani, *Hitchcock* 22655.

123. TRIPSACUM L.

Spikelets unisexual; pistillate spikelets solitary, embedded in the joints of a thickened cartilaginous articulate rachis, the indurate first glume covering the recess in the rachis, the joints readily separating at maturity; staminate spikelets in pairs at the joints of the continuous upper segment of the same rachis, this falling as a whole after anthesis. Stout perennials.

1. Tripsacum dactyloides (L.) L. Syst. Nat. ed. 10. 2: 1261. 1759.

Coix dactyloides L. Sp. Pl. 972. 1753.

Culms sparingly branching, about 2 meters tall, in large clumps; blades flat, up to 3 cm. wide; inflorescence of 1 to 3 erect spikes; staminate spikelets both nearly sessile, firm, obtuse.

Shady ravines and moist ground at low altitudes, central and southeastern United States, through the West Indies to Paraguay. Originally described from America, no definite locality given.

ECUADOR: Between Huigra and Naranjapata, *Hitchcock* 20643.

BOLIVIA: Coroico, *Hitchcock* 22721. Ixiamas, *White* 2324.

In White's no. 2324 the culms are covered with a white felty deciduous pubescence and the nodes are appressed-hispid.

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[48] Bull. Bot. Seringe 1: 219. 1830. Under the provisions of the Type-basis Code *Rytilix* is not effectively published.

124. COIX L.

Spikelets unisexual; pistillate spikelets 2 or 3 together, 1 fertile and 1 or 2 rudimentary, inclosed in a bony beadlike involucre (morphologically a subtending leaf sheath); staminate spikelets approximate in threes (the third sometimes obsolete) on a slender rachis, forming a short raceme, the rachis protruding from the orifice of the involucre, these ultimate inflorescences borne on the ends of numerous branches. Broad-leaved perennials.

1. **Coix lachryma-jobi** L. Sp. Pl. 972. 1753. JOBS-TEARS.

Freely branching, 1 meter or more tall, the cordate clasping blades 2 to 3 cm. broad, the "beads" 8 to 10 mm. long.

Moist ground and waste places at low altitudes, especially near dwellings, introduced throughout tropical America, cultivated as an ornamental and for the ivory or grayish beads; often escaped. Originally described from the East Indies.

ECUADOR: Milagro, *Hitchcock* 20194. Mount Chimborazo, *Spruce* 6127 (Kew Herb.).

PERU: Santa Ana, *Cook & Gilbert* 1424.

BOLIVIA: Espíritu Santo, *Buchtien* 2521. Yungas, *Bang* 527.

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LOCALITIES CITED

Nearly all the localities given on the labels of the specimens cited in the preceding work have been located on the maps of the region. These are listed below. A few localities have not been identified and are given in the distribution of specimens on the authority of the label only. The altitudes, especially in Bolivia, are taken from labels, and may represent points considerably above or below the city or town cited. The altitudes in Ecuador have been corrected by Wolf's Geografía y Geología del Ecuador, and in Peru by Weberbauer's Pflanzenwelt der Peruanischen Anden.

ECUADOR

AGOYÁN. River and falls near Ambato.

ALAUSÍ. On railroad between Guayaquil and Riobamba, Prov. Chimborazo, alt. 2500 meters.

ALTAR. See El Altar.

AMBATO. Capital, Prov. Tungurahua, alt. 2,600 meters.

ANGAMARCA. Prov. León, northwest of Ambato.

ANTISANA. Volcano southeast of Quito, alt. 5,756 meters.

ANTISANILLA. Hacienda, near Mount Antisana.

ATACATZO. Volcano, south of Quito, alt. 4,539 meters.

AZOGUES. Capital, Prov. Cañar.

AZUAY. Mountain, southern part Prov. Cañar.

BAHÍA DE CARAQUEZ. Prov. Manabí, mouth of Chave River.

BALAO. Seaport, southern part Prov. Guayas.

BAÑOS. Southeast of Ambato, near Volcano Tungurahua, valley of Pastasa River, alt. 1,800 meters.

BODEGAS (Babahoyo). Capital, Prov. Los Ríos.

BUCAY. On railroad east of Guayaquil at base of mountains, alt. 300 meters.

CAÑAR. Prov. Cañar, alt. 3,100 meters.

CASHURCO. East of Baños, near Mera. "Casha Urco" (Spruce).

CERRO MANGLAR ALTO. Northwestern part Prov. Guayas, east of Manglar Alto.

CHAMBO RIVER. Large river near Riobamba.

CHANCHÁN RIVER. Southern part Prov. Chimborazo.

CHANDUY. Coast, southeast of Salinas.

CHILLO. Valley, near Quito.

CHILLOGALLO. Southwest of Quito.

CHIMBORAZO. Volcano, northwest of Riobamba, alt. 6,310 meters.

CHIRA (La Chira). River, Dept. Piura.

CHOLLOGALLO. South of Quito.

CHOTA RIVER. North of Ibarra.

COLTA. Lake, west of Riobamba.

CORAZÓN. Mountain, south of Quito.

COTOCALLAO. Near Quito.

COTOPAXI. Station on railroad near Volcano Cotopaxi.

COTOPAXI. Volcano, northeast of Latacunga, alt. 5,943 meters.

CUENCA. Capital, Prov. Azuay, alt. 2,580 meters.
CUMBE. Prov. Azuay, south of Cuenca.
DAULE RIVER. Coastal plain.
EL ALTAR. Mountains, east of Riobamba.
EL RECREO. Prov. Manabí, near Cabo Pasado.
EL TAMBO. Prov. Loja, between Zaruma and Loja.
GUACHALÁ. Prov. Pichincha, northeast of Quito.
GUALAQUIZA. Northeast of Loja, on Gualaquiza River.
GUALEA. Prov. Pichincha, northwest of Quito.
GUAMANÍ. Mountain, north of Antisana, alt. 4,447 meters.
GUÁPULO. Nine kilometers from Quito, alt. 2,400 meters.
GUARANDA. Capital, Prov. Bolívar.
GUAYAQUIL. Capital, sea level.
GUAYRAPATA. Prov. Chimborazo.
HUANO (Guano). River, near Mount Chimborazo.
HUATAXI (Guataxi). Ranch, near Huigra.
HUIGRA. On railroad between Bucay and Alausí, alt. 1,200 meters.
IBARRA. Capital, Prov. Imbabura, alt. 2,225 meters.
IGUALATA. Mountain, between Ambato and Riobamba.
JUNTAS, LAS. Prov. Loja, north of Loja.
LA CHONTA. Between La Chorita and Portovelo.
LA CHORITA. Prov. Oro, near Santa Rosa.
LAKE COLTA. Prov. Chimborazo, west of Riobamba.
LA MAGDALENA. Near Quito.
LA RINCONADA RANCH. Prov. Carchi, southwest of Tulcán, alt. 3,000 meters.
LATACUNGA. Capital, Prov. León, alt. 2,800 meters.
LA TOMA. Prov. Loja, northwest of Loja, alt. 1,457 meters.
LLOA. Prov. Pichincha, west of Quito.
LOJA. Capital, Prov. Loja, alt. 2,220 meters.
LUISA. On railroad west of Riobamba.
MACHALA. Capital, Prov. Oro.
MALCHINGUÍ. Prov. Pichincha, north of Quito, alt. 2,878 meters.
MERA. East of Baños, on Pastasa River.
MILAGRO. On railroad between Guayaquil and Bucay, alt. 50 meters.
NABÓN. Prov. Azuay, south of Cuenca, alt. 2,765 meters.
NANEGAL. Prov. Pichincha, northwest of Quito.
NAPO RIVER. Flowing east from the Cotopaxi region.
NARANJAL. On Daule River.
NARANJAPATA. On railroad between Bucay and Huigra.
NARANJITO. On railroad east of Milagro.
NIEBLÍ. Prov. Pichincha, north of Quito.
NONO. Prov. Pichincha, northwest of Quito.
OÑA. Prov. Azuay, alt. 2,552 meters.
OTAVALO. Prov. Imbabura, alt. 2,580 meters.
PANACILLO. Hill, near Quito.
PANIGÓN PLANTATION. Twelve kilometers south of Milagro.
PERIPA. Prov. Pichincha, on upper Palenque River.
PERUCHO. Prov. Pichincha, north of Quito.
PICHINCHA. Mountain, near Quito, alt. 4.500 meters.
PIFO. Prov. Pichincha, east of Quito.
PINTAC. Southeast of Quito.
POMASQUI. Prov. Pichincha, north of Quito.
PORTOVELO. Gold mine, near Zaruma, Prov. Oro, alt. 1,200 meters.

PUCARÁ DE CHISALO. Pucará is a town in Prov. Azuay, east of Malchala, also (Alto de Pucará) a place near Ibarra, but Pucará de Chisalo may not be the same as either of these.
PUÉLLARO. Prov. Pichincha, near Malchinguí.
PUEMBO. Prov. Pichincha, east of Quito.
PUENTE DE CHIMBO. Upper valley of Chimbo River near Bucay, Prov. Bolívar.
PUERTO BOLÍVAR. Prov. Oro, seaport near Machala.
PUNA ISLAND. Gulf of Guayaquil.
PUNÍN. South of Riobamba.
PUNTAS. Mountain east of Quito.
QUEBRADA CHELÁN. Near Punín.
QUERO. South of Ambato.
QUITO. Prov. Pichincha, alt. 2,800 meters.
RIOBAMBA. Capital, Prov. Chimborazo, alt. 2,800 meters.
Río PILATÓN. Southwest of Quito.
Río TOACHE. Western León and Pichincha.
Río VERDE. Prov. Esmeraldas.
SALINAS. Coast, west of Guayaquil.
SANGUAY. Mountain, southeast of Riobamba.
SAN JOSÉ. Prov. Bolívar, south of Guaranda.
SAN LUCAS. Prov. Loja, north of Loja, alt. 2,650 meters.
SAN NICOLÁS. Unidentified locality of Sodiro, alt. 1,200 meters. There is an hacienda by this name near Mira in Prov. Carchi.
SAN PABLO URCU. Not identified. Probably San Pablo, east of Otavalo.
SANTA BÁRBARA. Unidentified locality of André. There is a Río Santa Bárbara in Prov. Azuay.
SANTA ROSA. Seaport, Prov. Oro.
SANTA ROSA DE CAÑAR. Southwest of Azogues.
SARAGURO (ZARAGURO). Seventy kilometers northwest of Loja, alt. 2,700 meters.
TABLÓN DE OÑA. Between Oña and Saraguro.
TANDAPÍ. Unidentified locality of Holmgren, "western slope of Andes, 1,500 to 2,000 meters."
TENGUEL. Lowland, south of Guayaquil.
TERESITA. Three kilometers west of Bucay.
TIGUA. River in western part of Prov. Esmeraldas, tributary of the Cojimico.
TIXAN (TIGSÁN). On railroad between Alausí and Palmira.
TOCACHI. Prov. Pichincha, northeast of Quito.
TULCÁN. Capital, Prov. Carchi, alt. 3,000 meters.
TUMBACO. East of Quito.
TUNGURAHUA. Volcano, southeast of Ambato, alt. 5,087 meters.
TUPIGACHI. Prov. Pichincha, northeast of Quito.
URBINA. On railroad near Mt. Chimborazo, alt. 3,600 meters.
VENTURA. On railroad above Bucay.

PERU

ABANCAY. Capital, Dept. Apurimac.
AGUAS CALIENTES. Near Cuzco.
AMBO. Dept. Huánuco south of Huánuco.
ARARANCA. Dept. Puno, on railroad south of La Raya, alt. 4,000 meters.
AREQUIPA. Capital, Prov. Arequipa, alt. 2,300 meters.
AYAPATA. Dept. Puno, near Macusani.

AYACUCHO. Capital, Dept. Ayacucho.
AZÁNGARO. Dept. Puno, north of Puno.
BAÑOS. West of Cerro de Pasco, on way from Casa Cancha, alt. 4,000 meters.
CAJATAMBO. Dept. Ancash.
CALLACATE. Hacienda near Cutervo.
CALLAO. Seaport of Lima.
CANDAMO. Dept. Puno, northern part.
CANI. Dept. Huánuco, near Mito.
CANRURU. Unidentified locality of Savatier.
CARAZ (CARÁS). Dept. Ancash, alt. 2,237 meters.
CARUMAS. Dept. Moquegua.
CASA CANCHA. Between Culnai and Cerro de Pasco, alt. 4,400 meters.
CASAPALCA (CASAPALTA). On railroad between Lima and Oroya, alt. 4,100 meters.
CASAPI. Dept. Huánuco, on the Huallaga River.
CERRO DE PASCO. Capital Dept. Junín, alt. 4,300 meters.
CHACHAPOYAS. Capital, Dept. Amazonas.
CHASQUI. Dept. Huánuco, near Mito.
CHAUPICHACA. Near Viso.
CHAVINILLO. Dept. Huánuco, west of Huánuco on Marañón River.
CHICLA. Dept. Lima, northeast of Lima, on railroad between Lima and Oroya, alt. 3,723 meters.
CHICOPLAYA. Dept. Huánuco, Dist. Monzón.
CHIVAY. Dept. Arequipa.
CHORRILLOS. East of Lima.
CHOSICA. On railroad between Lima and Oroya, alt. 1,000 meters.
CHUQUIBAMBILLA. Dept. Puno, on railroad north of Juliaca, alt. 3,900 meters.
COLONIA PERENÉ. Dept. Junín, plantation east of La Merced, alt. 600 meters.
COTAHUASI. Prov. La Unión, Dept. Arequipa.
CULNAI. Between Obrajillo and Cerro de Pasco, alt. 3,000 meters.
CUTERVO. Dept. Cajamarca, west of Chota.
CUYO-CUYO. Dept. Puno, south of Sandía, alt. 3,443 meters.
CUZCO. Capital, Dept. Cuzco, alt. 3,500 meters.
GOYLLARISQUISCA. Dept. Junín, end of railroad north of Cerro de Pasco, alt. 4,100 meters.
HACIENDA ATOCSAICO. Dept. Junín, west of Junín, alt. 4,000 meters.
HACIENDA CHINCHE. Dept. Junín, near Yanahuanca, alt. 3,500 meters.
HACIENDA PAMPAYACU. Dept. Huánuco, mouth of Chinchao River.
HACIENDA VILLCABAMBA. Dept. Huánuco, east of Huánuco, alt. 1,800 meters.
HUACACHI. Near Muña, alt. 2,000 meters.
HUALGAYOC. Dept. Cajamarca, north of Cajamarca, alt. 3,700 meters.
HUANTA. Dept. Ayacucho.
HUÁNUCO. Capital, Dept. Huánuco, alt. 1,860 meters.
HUARÓN. Dept. Junín, northern part, Cerro de Pasco region.
HUARAZ. Capital, Dept. Ancash.
JULIACA. Dept. Puno, on railroad between Arequipa and Cuzco, alt. 3,800 meters.
LAGUNILLAS. Dept. Puno, on railroad west of Juliaca, alt. 4,300 meters.
LAMAS. Dept. San Martín, west of Tarapoto.
LA MERCED. Dept. Junín, northeast of Tarma.
LA QUINHUA (QUINUA). Dept. Junín, gold mine near Goyllarisquisca, alt. 3,500 meters.
LA RAYA. On rail road between Juliaca and Cuzco, alt. 4,313 meters.
LIMA. Near sea level.

LLATA. Dept. Huánuco, western part.
LURIN. Southeast of Lima.
MACHU PICCHU. Urubamba Valley between Cuzco and Santa Ana.
MACUSANI. Dept. Puno.
MARAVILLAS. Dept. Puno, west of Lake Titicaca.
MATUCANA. On railroad between Lima and Oroya, alt. 2,374 meters.
MAYO RIVER. Prov. San Martín, northern part.
MIRAFLORES. Suburb of Lima.
MITO. Dept. Huánuco, 25 kilometers west of Huánuco, alt. 2,800 meters.
MOLLENDO. Seaport, Dept. Arequipa.
MONZÓN. Dept. Huánuco, north of Huánuco on Monzón River.
MOQUEGUA. Dept. Moquegua.
MOYOBAMBA. Capital, San Martín.
MUÑA. Dept. Huánuco, east of Huánuco, alt. 1,800 meters.
OBRAJILLO. Northeast part of Dept. Lima, near Canta, on way to Cerro de Pasco.
OCCA PAMPA. Dept. Puno, alt. 3,100 meters.
OCROS. Dept. Ancash, north of Supe, alt. 3,200 meters.
OLLANTAYTAMBO. North of Cuzco, alt. 3,000 meters.
OROYA (LA OROYA). Dept. Junín, on railroad between Lima and Cerro de Pasco, alt. 3,712 meters.
PACASMAYO. Seaport, north of Lima.
PAITA. Seaport, Dept. Piura.
PALCA. Dept. Junín, alt. 2,735 meters.
PANAO. Dept. Huánuco, east of Huánuco.
PANGOA RIVER. Dept. Junín, east of Tarma.
PANTICALLA PASS. Urubamba Valley, between Cuzco and Santa Ana, alt. 3,600 meters.
PARIAHUANCA. Not located; probably in the region of Huánuco.
PAUCARTAMBO. North of Cuzco.
PATAZ. Dept. Libertad, eastern part.
PIEDRA GRANDE. Dept. Huánuco, between Huánuco and Pozuzo.
PISCO. Seaport, Dept. Ica.
PIURA. Capital, Dept. Piura.
PLAYAPAMPA. Dept. Huánuco, near Tambo de Vaca.
POTO. Dept. Puno, south of Sandía, alt. 4,400 meters.
POZUZO. Dept. Huánuco, east of Huánuco.
PUCARÁ. Dept. Puno, on railroad north of Juliaca, alt. 3,882 meters.
PURUCHUCA. Prov. Lima, Dist. Ate.
RIMAC VALLEY. Vicinity of Lima.
Río BLANCO. On railroad between Lima and Oroya, alt. 3,600 meters.
Río HUALLAGO CANYON. Huánuco region.
Río DE LAS TRANCAS and Río LLAXWA. South of Nazca, Dept. Ica.
SACHAPATA. Dept. Puno, Prov. Carabaya.
SALAVERRY. Seaport, Dept. Libertad.
SAMANCO. Seaport, Prov. Ancash.
SAN ANTONIO. Dept. Puno, north of Azángaro.
SAN BARTOLOMÉ. On railroad east of Lima, alt. 1,511 meters.
SANDÍA. Dept. Puno, alt. 2,103 meters.
SAN GAVÁN (GABÁN). Dept. Puno, Prov. Carabaya.
SAN GALLÁN ISLAND. Near Pisco, Dept. Ica.
SAN GREGORIO. Dept. Huancavelica.
SAN JOSÉ. Dept. Junín, northern part.

SAN MIGUEL. Dept. Cuzco, Urubamba Valley, alt. 1,800 meters.
SANTA ANA. Dept. Cuzco, Urubamba Valley, alt. 900 meters.
SANTA CLARA. On railroad east of Lima.
SANTA CRUZ. Dept. Cajamarca, northwest of Cajamarca.
SANTA ROSA. Dept. Cuzco, south of Santa Ana.
SUMBAY. Dept. Arequipa, on railroad between Arequipa and Juliaca, alt. 4,000 meters.
TABINA. Dept. Puno.
TAMBILLO. Eleven kilometers southwest of Panao, alt. 2,400 meters. This is the locality visited by Macbride. The name is a common one and the Tambillo of other collectors (e. g. Jelski) may be different.
TAMBO DE VACA. Dept. Huánuco between Huánuco and Pozuzo, alt. 4,000 meters.
TARAPOTO. Dept. San Martín, southeast of Moyobamba, alt. 374 meters.
TARMA. Dept. Junín, northeast of Oroyo, alt. 3,080 meters.
TINTA. Dept. Cuzco, on railroad between Juliaca and Cuzco, alt. 3,500 meters.
TOCACHE. Dept. San Martín, southern part.
TORATA. Dept. Moquegua.
TORONTOY. Urubamba Valley, north of Cuzco, alt. 2,400 meters.
VALLE DE ANTA. Prov. Cuzco, alt. 3,280 meters.
VISO (TAMBO DE VISO). Dept. Lima, 8 kilometers above Matucana.
YANAHUANCA. Dept. Junín, northwest of Cerro de Pasco, alt. 3,000 meters
YANANO. Dept. Huánuco, 24 kilometers northeast of Panao.
YAULI. Dept. Junín, southwest of Oroya, alt. 4,090 meters.
YUNGAY. Dept. Ancash, south of Caraz, alt. 2,400 meters.
YURIMAGUAS. Dept. Loreto, east of Moyobamba, alt. 170 meters.

BOLIVIA

ACHACACHE. Dept. La Paz, near Lake Titicaca, alt. 4,000 meters.
AIQUILE. Cordillera Real, north of Sucre.
ANTAHUACANA. One hundred and fifty kilometers northeast of Cochabamba, alt. 750 meters.
ARQUE. South of Cochabamba.
ATOCHA. Dept. Potosí, on railroad between Uyuni and Tupiza.
BELLA VISTA. Dept. La Paz, Prov. Nor-Yungas, west of Coroico.
BERMEJO. Dept. Tarija, south of Tarija. There is another Bermejo southwest of Santa Cruz.
BOPI RIVER. Sur-Yungas, tributary of Beni.
BUENA VISTA. Dept. Santa Cruz, northwest of Santa Cruz, alt. 500 meters.
CALACOTO. Dept. La Paz, on railroad southwest of Corocoro, alt. 4,000 meters.
CALDERILLO. Vicinity of Tarija.
CAMACHO. Dept. Tarija, south of Tarija.
CAMATAQUÍ. Dept. Chuquisaca, northeast of Tupiza, alt. 2,500 meters.
CAÑAMINA. Dept. La Paz, Prov. Inquisivi, south of Espía.
CAPAI. One hundred kilometers southeast of La Paz.
CARABUCO. Dept. La Paz, near Lake Titicaca, alt. 4,200 meters.
CARANGAS. Dept. Oruro, western part.
CHACALTAYA. Dept. La Paz, north of La Paz, alt. 4,800 meters.
CHACO. Dept. Tarija.
CHALLAPATA. Dept. Oruro, on railroad between Oruro and Uyuni, alt. 3,900 meters.
CHARAGUA. Dept. Santa Cruz, southwestern part.
CHIGUANA. Dept. Potosí, on railroad near Chilean border.
CHOQUETANGA. Southeast of La Paz., alt. 3,600 meters.

CHUGIAGUILLO (TALCA CHUGUIAQUILLO). Southeast of La Paz.
CHULUMANI. Dept. La Paz, capital, Prov. Sur-Yungas, alt. 1,600 meters.
CHUQUISACA. Department north of Dept. Tarija, extending to Río Paraguay.
COBIJA. Territorio de Colonias, on Aquiry River.
COCHABAMBA. Capital, Dept. Cochabamba, alt. 2,500 meters.
COMANCHE. Dept. La Paz, on railroad south of Viacha, alt. 4,200 meters.
COMARAPA. Dept. Santa Cruz, west of Santa Cruz, alt. 1,900 meters.
COPACABANA. Dept. La Paz, near Lake Titicaca.
CORDILLERA SAN BONITO. Dept. Cochabamba.
CORIPATA. Dept. La Paz, Prov. Nor-Yungas, alt. 2,000 meters.
COROICO. Dept. La Paz, capital, Prov. Nor-Yungas, alt. 1,500 meters.
COTAÑA. Near Volcano Illimani, alt. 2,450 meters.
COVENDO. Dept. La Paz, Prov. Sur-Yungas, on Beni River, alt. 600 meters.
CREVAUX. Dept. Tarija, southeast of Villa Montes.
CUESTA SAN ANATON. Vicinity of Tarija.
ESPÍA. Dept. La Paz, Prov. Inquisivi, on Bopi River, alt. 600 meters.
ESPÍRITU SANTO. Dept. Cochabamba.
EUCALIPTUS. On railroad north of Oruro.
GARULAZO. "Prope Chuquisaca."
GENERAL CAMPERO. On railroad between Viacha and Arica, near Corocoto.
GRAN CHACO. Dept. Tarija.
GUANAY. Territorio de Colonias.
GUAQUI. Shore of Lake Titicaca.
GUCACHACA. Unidentified locality of Cárdenas, 4,000 meters, probably near La Paz.
HACIENDA ANACURI. Dept. La Paz, Prov. Nor-Yungas.
HACIENDA CASANA. Near Tipuani, alt. 1,400 meters.
HACIENDA SIMACO. Near Tipuani, alt. 1,400 meters.
HUACHI. Dept. La Paz, Sur-Yungas, on Beni River, alt. 1,800 meters.
HUANAY. Dept. La Paz, north of Covendo.
ILLIMANI. Volcano, east of La Paz.
INGENIO DEL ORO. Dept. La Paz, between Sorata and Mapiri.
ISLA DEL SOL. Island in Lake Titicaca.
IXIAMAS (ISIAMAS). Northern part Dept. La Paz, alt. 250 meters.
LA CUMBRE. Dept. La Paz, on railroad between La Paz and Pongo, alt. 4,600 meters.
LA FLORIDA. Dept. La Paz, Prov. Sur-Yungas, near Yanacachi, alt. 1,840 meters.
LA PAZ. Alt. 3,700 meters.
LLAVETAL. Tunari region, alt. 4,100 meters.
MAPIRI. Dept. La Paz, northern part Prov. Larecaja, alt. 570 meters.
MATARAL. Dept. Santa Cruz, southwest of Santa Cruz.
MILLUHUAYA. Dept. La Paz, Prov. Nor-Yungas, south of Coripata, alt. 1,300 meters.
OPLOCA. Dept. Potosí, north of Tupiza.
ORO INGENIO. Dept. Potosí, between Atocha and Tupiza.
ORURO. Capital, Dept. Oruro, alt. 3,730 meters.
PADCAYA. Dept. Tarija, south of Tarija.
PALCA. Between La Paz and Illimani.
PALMAR. Dept. Santa Cruz, near Santa Cruz, alt. 450 meters.
PASÑA. Dept. Oruro, on railroad south of Oruro, alt. 4,200 meters.
PEÑA BLANCA. Between Atocha and Tupiza.
PILAYA. Near Mount Illimani.
POLO-POLO. Near Coroico, Nor-Yungas, alt. 1,100 meters.
POTOSÍ. Capital, Dept. Potosí.

Pongo. Dept. La Paz, on railroad between La Paz and Yungas, alt. 3,600 meters.

Quiabaya. Dept. La Paz, north of Sorata.

Reyes. Western part Dept. Beni, alt. 300 meters.

Rinconada. Dept. La Paz, on railroad between La Paz and Pongo.

Río Piray. Dept. Santa Cruz.

Río Cuchí. Dept. Santa Cruz.

Río Guendá. Dept. Santa Cruz.

Río Perdiz. Dept. Santa Cruz.

Río Sanjana. Southeast of La Paz, alt. 3,000 meters.

Río San Juan. North of Valle Grande, Dept. Santa Cruz.

Río Surutú. Dept. Santa Cruz.

Rogagua. Lake in Dept. Beni (Yacuma), alt. 450 meters.

Rurrenabaque. Dept. Beni, on Beni River. Alt. 450 meters.

Samaipata. Dept. Santa Cruz, southwest of Santa Cruz, alt. 1,650 meters.

San Buena Ventura. Dept. La Paz, opposite Rurrenabaque, alt. 750 meters.

San Felipe. Dept. La Paz, Prov. Sur-Yungas, alt. 3,220 meters.

San José. Dept. La Paz, Prov. Nor-Yungas, alt. 1,500 meters.

Santa Cruz. Capital, Dept. Santa Cruz, 450 meters.

Santiago. Dept. Santa Cruz, Prov. Chiquitos, north of San José.

Sipascollo. Dept. Cochabamba, northeast of Totora.

Sirupaya. Dept. La Paz, Prov. Sur-Yungas, near Yanacachi, alt. 1,900 meters.

Sorata. East of Lake Titicaca, near Volcano Sorata.

Suches. Dept. La Paz.

Tablas. Dept. Cochabamba, north of Cochabamba.

Talca Chugiaguillo. See Chugiaguillo.

Tarija. Capital, Dept. Tarija.

Tipuani. Dept. La Paz, Prov. Larecaja, alt. 1,400 meters.

Titicaca. Lake between Peru and Bolivia, alt. 3,600 meters.

Tortora. Dept. Potosí, northwest of Potosí.

Totora. Vicinity of Santa Cruz, alt. 3,000 meters.

Tres Cruces. Dept. Santa Cruz, east of Santa Cruz, alt. 1,450 meters.

Tunari. Mountains north of Cochabamba. Cerro Tunari, alt. 5,200 meters.

Tupiza. Southern Bolivia, Prov. Sur-Chichas.

Unduavi. Dept. La Paz, Prov. Murillo, east of Pongo, alt. 3,246 meters.

Uyuni. Dept. Potosí, on railroad south of Oruro, alt. 3,700 meters.

Valle Grande. Dept. Santa Cruz, southwest of Santa Cruz, alt. 2,100 meters.

Viacha. Southwest of La Paz.

Villa Aspiazu. Dept. La Paz, Prov. Sur-Yungas.

Villa Montes. Dept. Tarija (Gran Chaco).

Yanacachi. Dept. La Paz, Prov. Sur-Yungas, west of Chulumani, alt. 2,300 meters.

Yungas. The region of Nor-Yungas and Sur-Yungas.

Zongo. Dept. La Paz, north of Pongo.

INDEX TO NUMBERED SPECIMENS

The following list includes the numbered specimens of the more important collectors cited in the distribution of the species. Two or more species when here listed under one number were distributed under this number by the collector.

Andre, Eduard

3259. Ichnanthus pallens.
3390. Arundinella berteroniana.
3419. Pennisetum tristachyum.
3483. Calamagrostis beyrichiana.
3515. Bouteloua simplex.
3560b. Chaetochloa geniculata.
3789. Cenchrus echinatus.
3907. Trisetum andinum.
4215. Pharus latifolius.
4499. Neurolepis aristata.

Anthony, H. E., and Tate, G. H. H.

50. Panicum trichoides.
63. Lasiacis ruscifolia.
79. Paspalum racemosum.
279. Poa subspicata.
281. Calamagrostis recta.
284. Agrostis nigritella.
328. Cortaderia rudiuscula.
329. Polypogon lutosus.
366. Agrostis breviculmis.
370. Agrostis tolucensis.
372. Polypogon lutosus.
435. Bromus unioloides.
441. Eragrostis nigricans.
442. Stipa ichu.
447. Polypogon lutosus.

Arcade, Brother

1. Festuca bromoides.
3. Briza minor.
4. Festuca bromides.
5. Eragrostis nigricans.
6. Eragrostis pilosa.
10. Avena sativa.
14. Poa annua.
15. Festuca megalura.
19. Trisetum spicatum.
20. Trisetum scabriflorum.

Asplund, E.

6416. Festuca megalura.
6458. Bromus lanatus.
6459. Bromus lanatus.
6460. Agropyron attenuatum.
6461. Agropyron breviaristatum.
6462. Lolium multiflorum.
6463. Calamagrostis violacea.
6464. Dissanthelium calycinum.
6465. Poa gymnantha.
6466. Poa scaberula.
6467. Agrostis haenkeana.
6473. Poa horridula.
6474. Puccinellia oresigena.
6475. Calamagrostis orbignyana.
6476. Trisetum spicatum.
6477. Dissanthelium minimum.
6478. Poa scaberula.
6479. Poa buchtienii.
6480. Calamagrostis heterophylla.
6481. Dissanthelium calycinum.
6482. Poa candamoana.
6484. Calamagrostis orbignyana.
6485. Munroa argentina.
6487. Munroa decumbens.
6488. Poa gymnantha.
6489. Agrostis tolucensis.
6490. Agrostis haenkeana.
6491. Calamagrostis heterophylla.
6492. Koeleria cristata.
6493. Calamagrostis violacea.
6494. Aciachne pulvinata.
6495. Poa gymnantha.
6496. Agrostis haenkeana.
6497. Trisetum spicatum.
6498. Muhlenbergia ligularis.
6499. Dissanthelium minimum.
6500. Triodia avenacea.
6501. Poa annua.
6503. Calamagrostis rigescens.
6504. Munroa decumbens.

ASPLUND, E.—Continued

6505. Dissanthelium calycinum.
6506. Calamagrostis violacea.
6507. Trisetum floribundum.
6508. Poa horridula.
6509. Calamagrostis amoena.
6510. Muhlenbergia ligularis.
6511. Calamagrostis vicunarum.
6512. Calamagrostis vicunarum.
6513. Stipa hans-meyeri.
6514. Calamagrostis antoniana.
6515. Stipa hans-meyeri.
6516. Calamagrostis curta.
6517. Calamagrostis violacea.
6518. Calamagrostis vicunarum.
6519. Calamagrostis brevifolia.
6520. Calamagrostis violacea.
6521. Bouteloua simplex.
6522. Bouteloua simplex.
6524. Eragrostis nigricans.
6524. Eragrostis lugens.
6525. Distichlis humilis.
6526. Anthochloa lepidula.
6527. Distichlis spicata.
6529. Poa asperiflora.
6530. Festuca dolichophylla.
6531. Festuca orthophylla.
6532. Calamagrostis orbignyana.
6533. Festuca dolichophylla.
6534. Festuca sublimis.
6535. Calamagrostis amoena.
6536. Festuca rigescens.
6537. Festuca rigescens.
6538. Festuca rigescens.
6539. Stipa nardoides.
6540. Aristida adscensionis.
6541. Aristida enodis.
6542. Aristida enodis.
6543. Nassella pubiflora.
6545. Stipa obtusa.
6546. Stipa holwayi.
6547. Stipa curviseta.
6548. Nassella asplundii.
6549. Nassella asplundii.
6550. Stipa curviseta.
6551. Stipa curviseta.
6552. Stipa speciosa.
6553. Stipa inconspicua.
6554. Stipa curviseta.
6555. Stipa inconspicua.
6556. Stipa polyclada.
6557. Stipa brachyphylla.
6558. Stipa inconspicua.

ASPLUND, E.—Continued

6560. Stipa mucronata.
6562. Stipa dasycarpa.
6563. Stipa polyclada.
6564. Stipa hans-meyeri.
6565. Stipa depauperata.
6566. Stipa capilliseta.
6567. Alopecurus aequalis.
6578. Festuca rigescens.
8466. Triodia avenacea.

BANG, MIGUEL

20. Agrostis tolucensis.
21. Eragrostis nigricans.
26. Cortaderia rudiuscula.
30. Melica adhaerens.
33. Festuca dolichophylla.
40. Polypogon lutosus.
47. Polypogon lutosus.
55. Pennisetum chilense.
79. Sporobolus argutus.
80. Eragrostis nigricans.
81. Bouteloua simplex.
82. Chloris beyrichiana.
102. Andropogon saccharoides parviflorus.
104. Calamagrostis rigescens.
108. Distichlis spicata.
109. Muhlenbergia ligularis.
155. Notholcus lanatus.
173. Festuca rigescens.
201. Eragrostis montufari.
218. Chaetochloa geniculata.
264. Syntherisma sanguinalis.
265. Paspalum buchtienii.
266. Panicum laxum.
267. Chloris distichophylla.
273. Chaetochloa geniculata.
276. Andropogon condensatus.
297. Isachne arundinacea.
307. Eragrostis lugens.
308. Paspalum jurgensii.
308a. Panicum laxum.
364. Pseudechinolaena polystachya.
487. Muhlenbergia quitensis.
493. Panicum quadriglume.
493. Panicum hebotes.
494. Lasiacis ligulata.
508. Olyra heliconia.
527. Coix lacryma-jobi.
680. Muhlenbergia tenuissima.
762. Lycurus phleoides.
773. Muhlenbergia peruviana.

BANG, MIGUEL—Continued

805. Calamagrostis amoena.
806. Muhlenbergia peruviana.
807. Festuca magalura.
808. Paspalum pygmaeum.
847a. Pariana zingiberina.
872. Axonopus capillaris.
998. Bouteloua curtipendula.
1078. Eragrostis cilianensis.
1079. Trachypogon montufari.
1080. Paspalum ceresia.
1105. Festuca megalura.
1289. Lasiacis sorghoidea.
1291. Lasiacis sorghoidea.
1306. Paspalum boliviensis.
1307. Aegopogon bryophilus.
1310. Hackelochloa granularis.
1310. Paspalum penicillatum.
1312. Paspalum remotum.
1426a. Paspalum multicaule.
1826. Chusquea scandens.
1843. Aciachne pulvinata.
1873. Dissanthelium calycinum.
2079. Oplismenus hirtellus.
2108. Echinochloa crusgalli crus-pavonis.
2131. Zeugites mexicana.
2160. Chaetochloa trichorhachis.
2168. Pennisetum setosum.
2173. Chloris radiata.
2340. Pennisetum tristachyum boliviense.
2348. Chusquea serrulata.
2588. Brachiaria plantaginea.
2589. Agrostis haenkeana.
2589½. Koeleria cristata.
2590. Paspalum humboldtianum.
2591. Sporobolus berteroanus.

BUCHTIEN, OTTO

2. Eragrostis nigricans.
26. Calamagrostis vicunarum.
123. Calamagrostis humboldtiana.
157. Nassella pubiflora.
157. Stipa inconspicua.
159. Calamagrostis vicunarum.
160. Muhlenbergia peruviana.
161. Bouteloua simplex.
161a. Bouteloua simplex.
184. Stipa obtusa.
208. Aristida adscensionis.
236. Poa pratensis.
237. Lolium temulentum.

BUCHTIEN, OTTO—Continued

239. Phalaris canariensis.
265. Pseudechinolaena polystachya.
267. Axonopus fissifolius.
410. Axonopus scoparius.
411. Andropogon leucostachyus.
412. Andropogon bicornis.
414. Panicum sciurotis.
415. Paspalum paniculatum.
416. Paspalum inconstans.
417. Paspalum penicillatum.
418. Syntherisma sanguinalis.
419. Axonopus fissifolius.
420. Paspalum buchtienii.
421. Eleusine indica.
422. Paspalum depauperatum.
423. Pennisetum tristachyum boliviense.
425. Chaetochloa scandens.
428. Eragrostis mexicana.
428. Eragrostis pilosa.
429. Panicum sellowii.
430. Calamagrostis beyrichiana.
430. Stipa mucronata.
431. Calamagrostis montevidensis.
431. Alopecurus bracteatus.
432. Oplismenus hirtellus.
433. Zeugites mexicana.
434. Andropogon condensatus.
435. Chaetochloa tenacissima.
443. Syntherisma sanguinalis.
444. Paspalum buchtienii.
446. Panicum trichanthum.
449. Chaetochloa scandens.
450. Olyra heliconia.
451. Pennisetum tristachyum boljviense.
501. Calamagrostis orbignyana.
503. Sporobolus berteroanus.
505. Melica adhaerens.
506. Hordeum halophilum.
518. Bromus pitensis.
551. Aristida adscensionis.
562. Eragrostis nigricans.
562a. Eragrostis nigricans.
573. Chloris beyrichiana.
574. Andropogon saccharoides parvispiculus.
736. Ichnanthus minarum.
737. Ichnanthus calvescens.
819. Muhlenbergia rigida.
820. Eragrostis pilosa.
820. Eragrostis nigricans.

BUCHTIEN, OTTO—Continued

839. Chusquea dombeyana.
839. Chusquea scandens.
841. Agrostis gelida.
842. Pennisetum chilense.
843. Bromus unioloides.
844. Bromus unioloides.
845. Bromus unioloides.
846. Poa horridula.
847. Eragrostis lurida.
848. Eragrostis montufari.
849. Eragrostis lugens.
850. Cortaderia rudiuscula.
851. Melica adhaerens.
854. Festuca megalura.
855. Stipa depauperata.
856. Stipa mucronata.
857. Aristida enodis.
858. Stipa brachyphylla.
859. Paspalum pygmaeum.
860. Distichlis humilis.
861. Alopecurus bracteatus.
862. Hordeum murinum.
864. Chaetochloa geniculata.
865. Muhlenbergia peruviana.
866. Calamagrostis heterophylla.
867. Polypogon lutosus.
869. Poa buchtienii.
870. Festuca dolichophylla.
871. Agropyron attenuatum.
1151. Andropogon condensatus.
1152. Andropogon bicornis.
1154. Chusquea delicatula.
1155. Olyra latifolia.
1156. Ichnanthus breviscrobs.
1157. Olyra buchtienii.
1158. Olyra micrantha.
1159. Panicum rudgei.
1160. Axonopus capillaris.
1162. Paspalum conjugatum.
1163. Eleusine indica.
1164. Paspalum paniculatum.
1166. Pseudechinolaena polystachya.
1167. Panicum stoloniferum.
1170. Pseudechinolaena polystachya.
1171. Panicum pantrichum.
1172. Panicum frondescens.
1173. Panicum frondescens.
1173a. Panicum frondescens.
1175. Arundinella berteroniana.
1177. Gynerium sagittatum.
1178. Cenchrus pauciflorus.
1183. Panicum pilosum.

BUCHTIEN, OTTO—Continued

1184. Stipa speciosa.
1185. Stipa ichu.
1186. Festuca orthophylla.
1188. Stipa inconspicua.
1189. Stipa inconspicua.
1190. Nassella pubiflora.
1191. Festuca rigescens.
1192. Calamagrostis ovata.
1193. Calamagrostis jamesoni.
1194. Dissanthelium peruvianum.
1195. Calamagrostis cephalantha.
1196. Anthochloa lepidula.
1197. Dissanthelium calycinum.
1199. Calamagrostis violacea.
1200. Calamagrostis vicunarum.
1201. Poa humillima.
1202. Calamagrostis vicunarum.
1203. Poa gymnantha.
1204. Agrostis haenkeana.
1205. Calamagrostis cephalantha.
1206. Aciachne pulvinata.
1207. Muhlenbergia fastigiata.
2464. Poa annua.
2465. Poa annua.
2466. Poa buchtienii.
2467. Poa buchtienii.
2468. Poa buchtienii.
2469. Poa buchtienii.
2470. Poa buchtienii.
2472. Poa candamoana.
2476. Bromus unioloides.
2478. Bromus unioloides.
2480. Bromus unioloides.
2481. Bromus unioloides.
2482. Poa horridula.
2484. Nassella pubiflora.
2485. Nassella pubiflora.
2486. Nassella pubiflora.
2487. Nassella pubiflora.
2488. Nassella pubiflora.
2489. Stipa obtusa.
2490. Paspalum pygmaeum.
2491. Polypogon lutosus.
2492. Stipa ichu.
2493. Aristida adscensionis.
2495. Calamagrostis humboldtiana.
2496. Poa scaberula.
2497. Ichnanthus candicans.
2498. Ichnanthus pallens.
2499. Lasiacis ligulata.
2500. Lasiacis sorgholdea.
2501. Panicum bolivlense.

BUCHTIEN, OTTO—Continued

2502. Panicum frondescens.
2504. Paspalum conjugatum.
2504a. Paspalum conjugatum.
2505. Axonopus compressus.
2506. Chaetochloa geniculata.
2508. Chaetochloa poiretiana.
2509. Paspalum remotum.
2510. Chaetochloa argentina.
2512. Chloris virgata.
2513. Paspalum saccharoides.
2514. Saccharum officinarum.
2515. Eragrostis pilosa.
2516. Eragrostis pilosa.
2518. Polypogon lutosus.
2519. Agrostis verticillata.
2520. Polypogon elongatus.
2520. Polypogon lutosus.
2521. Coix lacryma-jobi.
2522. Nassella pubiflora.
2523. Poa buchtienii.
2524. Koeleria cristata.
2525. Calamagrostis humboldtiana.
2527. Sporobolus berteroanus.
2528. Poa candamoana.
2529. Calamagrostis violacea.
2530. Calamagrostis humboldtiana.
2531. Agrostis exasperata.
2532. Bromus unioloides.
2533. Nassella pubiflora.
2534. Poa annua.
2535. Eragrostis nigricans.
2536. Poa pratensis.
2537. Agrostis attenuata.
2538. Bromus pitensis.
2539. Stipa obtusa.
2540. Aristida enodis.
2542. Poa candamoana.
2543. Bromus unioloides.
2544. Stipa ichu.
2545. Stipa ichu.
2546. Festuca dolichophylla.
2548. Polypogon lutosus.
2549. Poa asperiflora.
2550. Stipa inconspicua.
2551. Andropogon condensatus.
2576. Cortaderia bifida.
2578. Aegopogon cenchroides.
2579. Alopecurus bracteatus.
2581. Agrostis araucana.
2582. Poa horridula.
2583. Poa horridula.
2584. Poa denticulata.

BUCHTIEN, OTTO—Continued

2585. Agrostis perennans.
2586. Agrostis araucana.
2587. Trisetum spicatum.
3124. Sporobolus argutus.
3125. Paspalum humboldtianum.
3126. Paspalum distichum.
3127. Chaetochloa geniculata.
3128. Chaetochloa argentina.
3129. Aristida adscensionis.
3130. Bromus unioloides.
3131. Festuca dolichophylla.
3132. Cenchrus myosuroides.
3133. Polypogon elongatus.
3134. Stipa illimanica.
3135. Eragrostis pilosa.
3136. Leptochloa dubia.
3137. Leptochloa dubia.
3138. Eragrostis montufari.
3139. Polypogon lutosus.
3612. Panicum trichanthum.
3614. Paspalum inaequivalve.
3615. Holcus sorghum.
3618. Andropogon leucostachyus.
3619. Elyonurus adustus.
3620. Pennisetum tristachyum boliviense.
3621. Andropogon hassleri.
3622. Olyra heliconia.
3624. Echinochloa crusgalli crus-pavonis.
3627. Chaetochloa scandens.
3628. Axonopus scoparius.
3629. Paspalum buchtienii.
3630. Paspalum buchtienii.
3631. Chloris radiata.
3633. Chloris distichophylla.
3634. Syntherisma sanguinalis.
3635. Lasiacis sorghoidea.
3636. Brachiaria plantaginea.
3637. Sporobolus berteroanus.
3638. Eragrostis montufari.
3640. Panicum maximum.
3641. Phalaris canariensis.
3950. Calamagrostis heterophylla.
3962. Stipa mucronata.
3966. Festuca dolichophylla.
3967. Festuca dolichophylla.
4170. Panicum polygonatum.
4171. Cenchrus echinatus.
4172. Triniochloa stipoides.
4173. Phalaris latifolius.
4174. Panicum quadriglume.

BUCHTIEN, OTTO—Continued

4176. Nazia aliena.
4185. Chusquea scandens.
4189. Hackelochloa granularis.
4194. Eleusine indica.
4195. Chloris distichophylla.
4196. Paspalum paniculatum.
4197. Brachiaria plantaginea.
4257. Leptochloa uninervia.
4257. Stipa inconspicua.
4258. Andropogon altus.
4259. Andropogon bicornis.
4260. Andropogon leucostachyus.
4261. Andropogon condensatus.
4262. Ichnanthus minarum.
4263. Ichnanthus minarum.
4264. Ichnanthus calvescens.
4265. Thrasya campylostachya.
4266. Leptochloa domingensis.
4268. Aphanelytrum procumbens.
4269. Paspalum paniculatum.
4270. Chaetochloa geniculata.
4271. Lasiacis sorghoidea.
4272. Panicum maximum.
4273. Pseudechinolaena polystachya.
4274. Paspalum buchtienii.
4275. Axonopus capillaris.
4276. Axonopus fissifolius.
4277. Eragrostis lugens.
4278. Agrostis haenkeana.
4279. Chloris polydactyla.
4280. Briza mandoniana.
4485. Lycurus phleoides.
4486. Festuca dolichophylla.
4487. Lolium perenne.
4488. Festuca dolichophylla.
4518. Paspalum distichum.
5236. Ichnanthus ruprechtii.
5237. Ichnanthus ruprechtii.
5301. Oplismenus hirtellus.
5311. Andropogon bicornis.
5312. Andropogon bicornis.
5313. Echinochloa crusgalli crus-pavonis.
5314. Paspalum decumbens.
5315. Panicum laxum.
5316. Panicum glutinosum.
5317. Panicum cordovense.
5317. Panicum sellowii.
5318. Syntherisma sanguinalis.
5319. Panicum sciurotis.
5320. Pseudechinolaena polystachya.
5321. Ichnanthus candicans.

BUCHTIEN, OTTO—Continued

5322. Ichnanthus pallens.
5323. Paspalum paniculatum.
5324. Axonopus scoparius.
5325. Paspalum conjugatum.
5326. Axonopus fissifolius.
5327. Axonopus capillaris.
5328. Axonopus compressus.
5328. Axonopus scoparius.
5329. Chaetochloa tenacissima.
5330. Chaetochloa scandens.
5332. Eleusine indica.
5333. Olyra latifolia.
5334. Panicum polygonatum.
5335. Syntherisma violascens.
5336. Ichnanthus ruprechtii.
5337. Ichnanthus ruprechtii.
6414. Bromus unioloides.
6415. Festuca ulochaeta.
6417. Distichlis spicata.
6418. Koeleria cristata.
6419. Eleusine indica.
6420. Dissanthelium minimum.
6421. Eragrostis nigricans.
6422. Avena scabrivalvis.
6423. Chloris polydactyla.
6424. Chloris distichophylla.
6426. Agrostis perennans.
6427. Agrostis perennans.
6428. Calamagrostis violacea.
6429. Calamagrostis heterophylla.
6430. Calamagrostis montevidensis.
6431. Piptochaetium tuberculatum.
6432. Eriochloa punctata.
6433. Olyra heliconia.
6434. Axonopus fissifolius.
6435. Paspalum paniculatum.
6436. Paspalum paniculatum.
6437. Pseudechinolaena polystachya.
6439. Syntherisma sanguinalis.
6440. Syntherisma sanguinalis.
6441. Panicum laxum.
6442. Lasiacis sorghoidea.
6443. Trichachne sacchariflora.
6444. Syntherisma violascens.
6445. Paspalum decumbens.
6446. Andropogon bicornis.
6447. Andropogon condensatus.
6448. Andropogon condensatus.
6468. Pseudechinolaena polystachya.
6468. Trisetum spicatum.
6469. Koeleria cristata.
6470. Koeleria cristata.

BUCHTIEN, OTTO—Continued

6471. Poa gymnantha.
6472. Calamagrostis orbignyana.
6528. Poa annua.
7105. Paspalum decumbens.
7106. Paspalum decumbens.
7107. Paspalum inconstans.
7108. Paspalum pilosum.
7109. Paspalum inconstans.
7110. Paspalum malacophyllum.
7111. Paspalum inconstans.
7112. Paspalum lineispatha.
7114. Panicum sellowii.
7115. Panicum sciurotis.
7116. Panicum sciurotis.
7117. Isachne arundinacea.
7118. Axonopus marginatus.
7120. Panicum frondescens.
7121. Eragrostis lugens.
7122. Panicum laxum.
7123. Ichnanthus peruvianus.
7124. Ichnanthus ruprechtii.
7126. Syntherisma sanguinalis.
7127. Panicum laxum.
7128. Syntherisma violascens.
7129. Panicum polygonatum.
7130. Axonopus barbigerus.
7134. Andropogon hirtiflorus.
7136. Andropogon leucostachyus.
7137. Andropogon bicornis.
7138. Elyonurus adustus.
7139. Poa annua.
7140. Eragrostis montufari.
7142. Axonopus aureus.
7144. Aegopogon bryophilus.
7145. Trachypogon plumosus.
7146. Leptocoryphium lanatum.
7147. Sporobolus aeneus.

CÁRDENAS, MARTÍN (MULFORD BIOL. EXPL.)

36 S. Agrostis gelida.
69 S. Sporobolus berteroanus.
70 S. Stipa mucronata.
299. Chloris polydactyla.
695. Sporobolus berteroanus.
1166. Arundinella berteroniana.
1175. Paspalum conjugatum.
1647. Panicum stramineum.
1656. Paspalum millegrana.
1665. Elyonurus adustus.
1704. Panicum frondescens.

CÁRDENAS, MARTÍN (MULFORD BIOL. EXPL.)—Continued

1708. Chaetochloa geniculata.
1772. Panicum pilosum.
1889. Pariana zingiberina.
1893. Chaetochloa vulpiseta.
1909. Panicum procurrens.
2143. Andropogon bicornis.
2144. Eragrostis montufari.

COOK, O. F., AND GILBERT, G. B.

56. Eragrostis peruviana.
168. Muhlenbergia fastigiata.
173. Aciachne pulvinata.
174. Calamagrostis vicunarum.
183. Calamagrostis vicunarum.
189. Hordeum vulgare.
211. Muhlenbergia peruviana.
222. Hordeum vulgare.
447. Sporobolus berteroanus.
478. Festuca megalura.
479. Bouteloua simplex.
510. Festuca dichoclada.
514. Muhlenbergia rigida.
516. Sporobolus berteroanus.
518. Sporobolus berteroanus.
520. Aristida adscensionis.
676. Stipa ichu.
684. Stipa plumosa.
699. Aegopogon cenchroides.
700. Paspalum bonplandianum.
858. Paspalum candidum.
902. Axonopus scoparius.
923. Lasiacis divaricata.
938. Oplismenus hirtellus.
958. Muhlenbergia diversiglumis.
965. Chusquea huantensis.
1132. Andropogon condensatus.
1189. Lamprothyrsus peruvianus.
1297. Dissanthelium calycinum.
1305. Dissanthelium calycinum.
1424. Coix lacryma-jobi.
1427. Panicum barbinode.
1428. Holcus halepensis.
1429. Chaetochloa poiretiana.
1514. Holcus halepensis.
1523. Chaetochloa poiretiana.
1530. Panicum barbinode.
1531. Paspalum virgatum.
1532. Chloris distichophylla.
1533. Imperata contracta.
1548. Chaetochloa vulpiseta.

COOK, O. F., AND GILBERT, G. B.—Contd.

1576. Chloris distichophylla.
1632. Pennisetum bambusiforme.
1638. Hyparrhenia bracteata.
1653. Olyra heliconia.
1828. Aciachne pulvinata.
1910. Cortaderia rudiuscula.

CUMING, HUGH

1063. Cenchrus myosuroides.
1054. Paspalum racemosum.

DIDRICHSEN, F.

4383. Sporobolus virginicus.
4384. Paspalum vaginatum.
4387. Paspalum racemosum.
4393. Cenchrus hillebrandianus.
4394. Panicum aquaticum.

D'ORBIGNY, A.

136. Dissanthelium minimum.
166. Paspalum boliviense.
185. Calamagrostis vicunarum.
186. Dissanthelium calycinum.
187. Calamagrostis vicunarum.
191. Dissanthelium calycinum.
194. Poa humillima.
201. Muhlenbergia peruviana.
202. Calamagrostis heterophylla.
217. Calamagrostis orbignyana.
219. Calamagrostis curvula.
222. Calamagrostis vicunarum.

EGGERS, H. F. A.

14104. Paspalum fasciculatum.
14149. Panicum stoloniferum.
14345. Panicum megiston.
14407. Olyra latifolia.
14481. Panicum trichoides.
14558. Eragrostis hypnoides.
14584. Chaetochloa membranifolia.
14585. Panicum laxum.
14602. Paspalum vaginatum.
14630. Chloris radiata.
14632. Paspalum repens.
14633. Hymenachne donacifolia.
14646. Paspalum conjugatum.
14655. Ichnanthus axillaris.
14658. Axonopus compressus.
14668. Paspalum orbiculatum.
14669. Olyra latifolia.
14724. Orthoclada laxa.

EGGERS, H. P. A.—Continued

14772. Eriochloa pacifica.
14773. Oryza latifolia.
14863. Streptochaeta spicata.
14897. Oplismenus rariflorus.
14965. Paspalum racemosum.
15068. Olyra latifolia.
15147. Pseudechinolaena polystachya.
15188. Pharus parvifolius.
15209. Pharus latifolius.
15417. Panicum trichoides.
15418. Panicum fasciculatum.
15419. Panicum ghiesbreghtii.
15423. Eriochloa eggersii.
15553. Lasiacis ruscifolia.
15572. Lasiacis oaxacensis.
15701. Sporobolus argutus.
15701. Panicum boliviense.
15813. Phragmites communis.
15834. Panicum fasciculatum.
15836. Axonopus compressus.

FIEBRIG, K.

2099. Lamprothyrsus hieronymi.
2189. Luziola peruviana.
2384. Sporobolus eximius.
2437. Pennisetum latifolium.
2528. Eragrostis pilosa.
2552. Bouteloua megapotamica.
2577. Elyonurus tripsacoides.
2595. Pennisetum chilense.
2629. Bouteloua simplex.
2633. Muhlenbergia fastigiata.
2656. Cortaderia rudiuscula.
2787. Andropogon cirratus.
2821. Agrostis boliviana.
2859. Andropogon tener.
2864. Trachypogon montufari.
2865. Aegopogon bryophilus.
2904. Bromus unioloides.
2905. Agrostis boliviana.
2907. Agrostis montevidensis.
2936. Poa scaberula
2954. Phragmites communis.
2955. Festuca dolichophylla.
3043. Cortaderia rudiuscula.
3074. Heteropogon contortus.
3117. Festuca procera.
3118. Festuca procera.
3119. Calamagrostis tarmensis.
3120. Calamagrostis tarmensis.
3154. Andropogon tener.
3159. Festuca megalura.

FIEBRIG, K.—Continued

3172. Calamagrostis calderillensis.
3173. Muhlenbergia angustata.
3191. Calamagrostis fiebrigii.
3192. Festuca orthophylla.
3277. Muhlenbergia peruviana.
3281. Bouteloua curtipendula.
3282. Bouteloua curtipendula.
3571. Aciachne pulvinata.

FRIES, R. E.

1058. Bouteloua simplex.
1058a. Bouteloua simplex.
1059. Chloris virgata.
1060. Chloris beyrichiana.
1061. Eragrostis cilianensis.
1064. Paspalum distichum.
1065. Aristida adscensionis.
1091. Dactyloctenium aegyptium.
1093. Sporobolus argutus.
1094. Leptochloa dubia.
1099. Pappophorum mucronulatum.
1100. Eragrostis pilosa.
1103. Cenchrus myosuroides.
1105. Sporobolus berteroanus.
1116a. Chaetochloa geniculata.
1214. Heteropogon contortus.
1221. Pappophorum wrightii.
1229. Imperata minutiflora.
1301. Calamagrostis tarmensis.
1308. Stipa pampagrandensis.
1463. Eragrostis articulata.
1470. Gouinia virgata.
1472. Aristida adscensionis.
1589. Aristida mendocina.
1622. Arundo donax.
1691. Bouteloua aristidoides.

HARTEMAN, BROTHER

1. Eragrostis nigricans.
2. Chaetochloa geniculata.
3. Bromus unioloides.
4. Bromus pitensis.
5. Eragrostis patula.
6. Agrostis stolonifera.
7. Trisetum spicatum.
7a. Festuca sublimis.
8. Bromus unioloides.
9. Anthoxanthum odoratum.
11. Trisetum spicatum.
12. Agrostis tolucensis.
13. Poa trivialis.

HARTEMAN, BROTHER—Continued

13. Agrostis tolucensis.
15. Bromus pitensis.
16. Paspalum lividum.
17. Bromus unioloides.
17. Agrostis tolucensis.
18. Agropyron attenuatum.
18. Chaetochloa geniculata.
19. Cortaderia rudiuscula.
22. Stipa mucronata.
24. Andropogon saccharoides parvispiculus.
25. Briza mandoniana.
26. Aegopogon cenchroides.
28. Chaetochloa geniculata.
29. Eragrostis patula.
30. Agrostis tolucensis.
32. Polypogon elongatus.
33. Paspalum pallidum.
36. Polypogon elongatus.
37. Polypogon elongatus.
38. Agrostis tolucensis.
39. Festuca procera.
40. Triniochloa stipoides.
41. Brachypodium mexicanum.
42. Briza mandoniana.
44. Eragrostis nigricans.
45. Poa annua.
47. Bromus unioloides.
48. Notholcus lanatus.
49. Dactylis glomerata.
50. Festuca bromoides.
51. Polypogon lutosus.
52. Briza minor.
53. Agrostis tolucensis.
54. Chaetochloa geniculata.
55. Eragrostis patula.
56. Aegopogon cenchroides.
58. Stipa mucronata.
59. Polypogon elongatus.
60. Andropogon saccharoides parvispiculus.
61. Agrostis attenuata.
62. Calamagrostis heterophylla.
63. Andropogon hirtiflorus.
64. Trachypogon montufari.
64a. Andropogon condensatus.
65. Paspalum humboldtianum.
66. Axonopus compressus.
67. Festuca dolichophylla.
69. Calamagrostis jamesoni.
70. Agrostis perennans.
71. Festuca bromoides.

HARTEMAN, BROTHER—Continued

73. Dactylis glomerata.
76. Poa pardoana.
78. Bromus lanatus.
80. Anthoxanthum odoratum.
81. Andropogon condensatus.
82. Agrostis nigritella.
83. Poa cucullata.
84. Calamagrostis ligulata.
85. Poa pardoana.

HARTWEG, C. T.

704. Chaetochloa vulpiseta.
1447. Paspalum bonplandianum.
1448. Chaetochloa geniculata.
1449. Trisetum andinum.
1450. Poa vaginalis.
1452. Eragrostis pastoensis.
1454. Festuca australis.
1456. Calamagrostis recta.
1459. Andropogon condensatus.
1460. Andropogon condensatus.

HERZOG, TH.

1210. Paspalum ceresia.
1211. Cynodon dactylon.
1236. Eragrostis articulata.
1302. Andropogon lateralis.
1308. Heteropogon villosus.
1309a. Eragrostis articulata glabrescens.
1345. Paspalum plicatulum.
1413. Eriochrysis cayennensis.
1434. Eleusine indica.
1442. Aristida complanata.
1443. Chaetochloa geniculata.
1444. Panicum laxum.
1445. Panicum olyroides.
1446. Sporobolus tenuissimus.
1448. Microchloa indica.
1449. Tripogon spicatus.
1464. Leptochloa domingensis.
1524. Panicum paucispicatum.
1558. Tristachya chrysothrix.
1578. Pharus glaber.
1594. Pseudechinolaena polystachya.
1654. Paspalum ekmanianum.
1656. Sorghastrum parviflorum.
1669. Chloris beyrichiana.
1693. Trachypogon montufari.
1702. Andropogon hirtiflorus.
1705. Trachypogon montufari.

HERZOG, TH.—Continued

1705. Eragrostis bahiensis.
1709. Axonopus siccus.
1756. Paspalum malacophyllum.
1763. Syntherisma leiantha.
1789. Sorghastrum stipoides.
1790. Lycurus phleoides.
1804. Trichloris mendocina.
1817. Ichnanthus minarum.
1836. Paspalum malacophyllum.
1854. Andropogon saccharoides perforatus.
1855. Stipa plumosa.
1925. Leptochloa dubia.
1928. Trichloris pluriflora.
2037. Bouteloua simplex.
2038. Muhlenbergia peruviana.
2052. Festuca dolichophylla.
2054. Calamagrostis amoena.
2057. Muhlenbergia peruviana.
2069. Trichachne saccharata.
2070. Andropogon saccharoides laguroides.
2071. Andropogon saccharoides parvispiculus.
2072. Bouteloua curtipendula.
2079. Calamagrostis humboldtiana.
2080. Calamagrostis eminens.
2100. Anthochloa lepidula.
2107. Calamagrostis ovata.
2126. Elyonurus tripsacoides.
2182. Poa myriantha.
2194. Cortaderia bifida.
2226. Muhlenbergia peruviana.
2383. Chusquea scandens.
2396. Arundinaria herzogiana.
2515. Distichlis humilis.
3004. Panicum echinulatum.
3011. Nassella pubiflora.
3017. Briza mandoniana.

HITCHCOCK, A. S.

19914. Panicum barbinode.
19915. Eriochloa polystachya.
19916. Panicum geminatum.
19917. Chloris radiata.
19943. Bouteloua pilosa.
19947. Panicum trichoides.
19948. Paspalum scabrum.
19949. Syntherisma aequatoriensis.
19953. Pennisetum occidentale.
19955. Paspalum racemosum.
19962. Olyra latifolia.

HITCHCOCK, A. S.—Continued

19963. Lasiacis ruscifolia.
19969. Panicum trichoides.
19977. Sporobolus argutus.
19990. Chloris radiata.
20000. Sporobolus argutus.
20006. Dactyloctenium aegyptium.
20015. Eragrostis ciliaris.
20032. Anthephora hermaphrodita.
20050. Oryza latifolia.
20056. Chloris angustiflora.
20056½. Syntherisma aequatoriensis.
20057. Lasiacis ruscifolia.
20064. Chloris angustiflora.
20065. Syntherisma sanguinalis.
20074. Hymenachne amplexicaulis.
20080. Oplismenus burmanni.
20083. Echinochloa colonum.
20092. Eragrostis viscosa.
20107. Leptochloa filiformis.
20124. Chaetochloa tenax.
20125. Lasiacis ruscifolia.
20129. Lasiacis ruscifolia.
20132. Paspalum racemosum.
20133. Lasiacis sorghoidea.
20134. Paspalum racemosum.
20135. Lasiacis ruscifolia.
20136. Lasiacis ruscifolia.
20147. Oplismenus hirtellus.
20158. Lasiacis ruscifolia.
20161. Paspalum conjugatum.
20163. Leptochloa filiformis.
20168. Eragrostis hypnoides.
20171. Eleusine indica.
20172. Leptochloa scabra.
20174. Axonopus compressus.
20175. Oplismenus burmanni.
20176. Eragrostis ciliaris.
20177. Paspalum microstachyum.
20178. Chloris radiata.
20179. Eragrostis amabilis.
20180. Paspalum paniculatum.
20188. Cenchrus viridis.
20193. Panicum maximum.
20194. Coix lachryma-jobi.
20199. Panicum barbinode.
20202. Paspalum orbiculatum.
20213. Panicum trichoides.
20214. Panicum trichanthum.
20215. Panicum fasciculatum.
20224. Ichnanthus pallens.
20233. Axonopus compressus.
20236. Lasiacis ruscifolia.

HITCHCOCK, A. S.—Continued

20237. Oplismenus hirtellus.
20252. Leersia hexandra.
20254. Pennisetum nervosum.
20256. Eriochloa punctata.
20257. Panicum laxum.
20266. Hackelochloa granularis.
20271. Syntherisma aequatoriensis.
20272. Syntherisma digitata.
20274. Paspalum scabrum.
20279. Manisuris fasciculata.
20283. Panicum megiston.
20285. Leptochloa virgata.
20294. Panicum trichanthum.
20295. Lasiacis sorghoidea.
20299. Lasiacis oaxacensis.
20313. Chaetochloa geniculata.
20322. Muhlenbergia diversiglumis.
20326. Pereilema beyrichianum.
20328. Andropogon saccharoides parvispiculus.
20329. Heteropogon melanocarpus.
20333. Uniola condensata.
20341. Paspalum racemosum.
20344. Melica scabra.
20349. Polypogon lutosus.
20350. Polypogon elongatus.
20353. Pennisetum tristachyum.
20360. Cenchrus echinatus.
20361. Chaetochloa cernua.
20362. Lasiacis sorghoidea.
20376. Lasiacis sorghoidea.
20382. Sporobolus berteroanus.
20399. Muhlenbergia microsperma.
20413. Paspalum decumbens.
20424. Panicum polygonatum.
20425. Ichnanthus axillaris.
20429. Oplismenus rariflorus.
20432. Lasiacis ruscifolia.
20433. Panicum polygonatum.
20434. Paspalum orbiculatum.
20437. Lasiacis oaxacensis.
20438. Lasiacis ligulata.
20445. Ichnanthus pallens.
20446. Ichnanthus pallens.
20467. Panicum pilosum.
20468. Ichnanthus axillaris.
20470. Axonopus scoparius.
20472. Chaetochloa geniculata.
20499. Imperata contracta.
20517. Gynerium sagittatum.
20521. Axonopus scoparius.
20523. Lasiacis ligulata.

HITCHCOCK, A. S.—Continued

20524. Lasiacis ruscifolia.
20534. Isachne arundinacea.
20535. Panicum schiffneri.
20536. Panicum pulchellum.
20538. Chaetochloa sulcata.
20555. Axonopus scoparius.
20556. Gynerium sagittatum.
20559. Eriochloa punctata.
20560. Imperata contracta.
20562. Eriochloa polystachya.
20565. Hackelochloa granularis.
20566. Andropogon brevifolius.
20568. Lasiacis oaxacensis.
20569. Lasiacis ruscifolia.
20570. Eragrostis glomerata.
20571. Panicum megiston.
20573. Oplismenus hirtellus.
20576. Lasiacis ruscifolia.
20577. Arundo donax.
20580. Panicum hirsutum.
20581. Chaetochloa vulpiseta.
20584. Lasiacis ruscifolia.
20596. Cenchrus viridis.
20598. Axonopus scoparius.
20599. Paspalum conjugatum.
20601. Panicum hirsutum.
20602. Pennisetum nervosum.
20607. Lasiacis sorghoidea.
20608. Chaetochloa geniculata.
20609. Syntherisma aequatoriensis.
20610. Stipa mucronata.
20613. Eragrostis pilosa.
20616. Andropogon saccharoides perforatus.
20621. Heteropogon melanocarpus.
20626. Andropogon cirratus.
20627. Triniochloa stipoides.
20628. Heteropogon contortus.
20629. Bouteloua pilosa.
20635. Pereilema beyrichianum.
20643. Tripsacum dactyloides.
20652. Paspalum saccharoides.
20653. Andropogon saccharoides parvispiculus.
20654. Chaetochloa tenax.
20655. Andropogon saccharoides perforatus.
20656. Paspalum humboldtianum.
20659. Pennisetum setosum.
20660. Andropogon saccharoides lagunoides.
20661. Aristida adscensionis.

HITCHCOCK, A. S.—Continued

20668. Pennisetum peruvianum.
20669. Pennisetum tristachyum.
20672. Panicum schiffneri.
20677. Andropogon bicornis.
20680. Pereilema beyrichianum.
20682. Chaetochloa poiretiana.
20686. Nassella pubiflora.
20687. Aristida adscensionis.
20689. Bromus unioloides.
20690. Eragrostis pilosa.
20691. Eragrostis lurida.
20695. Chloris radiata.
20696. Bouteloua simplex.
20698. Stipa milleana.
20700. Cortaderia rudiuscula.
20701. Stipa ichu.
20707. Festuca australis.
20708. Stipa depauperata.
20709. Sporobolus berteroanus.
20712. Stipa depauperata.
20713. Eragrostis lurida.
20716. Aristida spadicea.
20717. Aegopogon cenchroides.
20718. Eragrostis montufari.
20721. Stipa mucronata.
20723. Paspalum depauperatum.
20722. Agropyron attenuatum.
20727. Stipa milleana.
20738. Melica scabra.
20741. Chusquea peruviana.
20743. Stipa mucronata.
20744. Lasiacis ligulata.
20746. Festuca eminens.
20752. Trachypogon montufari.
20753. Andropogon saccharoides perforatus.
20754. Lasiacis ligulata.
20757. Stipa mucronata.
20758. Eragrostis montufari.
20759. Trisetum deyeuxioides.
20760. Bromus pitensis.
20761. Aristida marginalis.
20762. Festuca megalura.
20765. Aristida schiedeana.
20766. Andropogon hirtiflorus.
20767. Andropogon brevifolius.
20768. Muhlenbergia diversiglumis.
20771. Stipa mucronata.
20772. Chaetochloa cernua.
20773. Eragrostis patula.
20774. Stipa depauperata.
20782. Paspalum bonplandianum.

HITCHCOCK, A. S.—Continued

20797. Calamagrostis planifolia.
20798. Festuca procera.
20799. Bromus pitensis.
20800. Agrostis perennans.
20809. Stipa neesiana.
20818. Agropyron attenuatum.
20819. Aegopogon cenchroides.
20825. Chusquea scandens.
20827. Calamagrostis heterophylla.
20828. Agrostis tolucensis.
20829. Bromus pitensis.
20830. Chaetochloa vulpiseta.
20831. Trichachne insularis.
20832. Paspalum macrophyllum.
20833. Chaetochloa cernua.
20834. Sporobolus argutus.
20855. Cortaderia nitida.
20856. Agropyron attenuatum.
20857. Agrostis breviculmis.
20862. Cortaderia nitida.
20863. Neurolepis aristata.
20864. Bromus pitensis.
20865. Festuca australis.
20875. Calamagrostis planifolia.
20886. Triniochloa stipoides.
20897. Eragrostis pastoensis.
20898. Stipa ibarrensis.
20899. Polypogon lutosus.
20900. Polypogon elongatus.
20901. Stipa mucronata.
20902. Eragrostis pastoensis.
20903. Andropogon saccharoides parvispiculus.
20904. Eragrostis patula.
20905. Notholcus lanatus.
20914. Calamagrostis podophora.
20916. Calamagrostis effusa.
20918. Calamgrostis humboldtiana.
20919. Poa pardoana.
20920. Calamagrostis bogotensis.
20921. Calamagrostis heterophylla.
20922. Bromus lanatus.
20938. Festuca australis.
20958. Trisetum scabriflorum.
20967. Paspalum pilgerianum.
20972. Calamagrostis planifolia.
20974. Bromus unioloides.
20975. Stipa mucronata.
20989. Paspalum bonplandianum.
20994. Stipa mucronata.
21008. Polypogon elongatus.
21009. Brachypodium mexicanum.

HITCHCOCK, A. S.—Continued

21011. Calamagrostis heterophylla.
21018. Bromus pitensis.
21019. Torresia redolens.
21021. Agrostis tolucensis.
21026. Aegopogon cenchroides.
21027. Bromus unioloides.
21028. Bromus pitensis.
21031. Calamagrostis planifolia.
21036. Poa annua.
21037. Stipa mucronata.
21039. Bromus lanatus.
21040. Trisetum scabriflorum.
21041. Briza mandoniana.
21042. Festuca ulochaeta.
21045. Agrostis tolucensis.
21048. Poa cucullata.
21053. Agrostis nigritella.
21058. Festuca breviaristata.
21059. Trisetum andinum.
21063. Calamagrostis coarctata.
21082. Agrostis haenkeana.
21083. Poa pardoana.
21085. Calamagrostis recta.
21092. Stipa mucronata.
21093. Agropyron attenuatum.
21094. Festuca procera.
21099½. Phragmites communis.
21101. Sporobolus virginicus.
21103. Sporobolus argutus.
21126. Olyra latifolia.
21130. Lasiacis ruscifolia.
21131. Lasiacis oaxacensis.
21134. Olyra latifolia.
21136. Ichnanthus candicans.
21137. Chaetochloa vulpiseta.
21138. Paspalum microstachyum.
21146. Lasiacis sorghoidea.
21156. Pennisetum setosum.
21157. Arundinella confinis.
21177. Oplismenus hirtellus.
21180. Lasiacis divaricata.
21181. Axonopus compressus.
21184. Lasiacis divaricata.
21189. Paspalum lepidum.
21191. Panicum sciurotis.
21192. Calamagrostis beyrichiana.
21193. Axonopus scoparius.
21196. Lasiacis sorghoidea.
21199. Ichnanthus candicans.
21200. Panicum pantrichum.
21202. Ichnanthus axillaris.
21204. Paspalum inconstans.

HITCHCOCK, A. S.—Continued

21205. Isachne arundinacea.
21206. Paspalum depauperatum.
21210. Paspalum decumbens.
21211. Panicum sciurotis.
21211½. Panicum sciurotis.
21212. Panicum pulchellum.
21213. Ichnanthus pallens.
21251. Andropogon saccharoides laguroides.
21252. Leptochloa virgata.
21253. Panicum hirtum.
21254. Axonopus capillaris.
21256. Panicum polygonatum.
21257. Paspalum orbiculatum.
21260. Hyparrhenia bracteata.
21261. Andropogon semiberbis.
21262. Imperata brasiliensis.
21263. Andropogon leucostachys.
21266. Chaetochloa geniculata.
21267. Axonopus scoparius.
21268. Eragrostis viscosa.
21269. Paspalum pilosum.
21270. Trachypogon montufari.
21271. Andropogon semiberbis.
21273. Chaetochloa vulpiseta.
21274. Andropogon bicornis.
21278. Andropogon condensatus.
21280. Raddia capillata.
21284. Arundinella confinis.
21288. Imperata brasiliensis.
21293. Aristida adscensionis.
21294. Aristida capillacea.
21300. Panicum glutinosum.
21302. Panicum sciurotis.
21303. Ichnanthus candicans.
21305. Aristida marginalis.
21306. Paspalum humboldtianum.
21309. Panicum sellowii.
21310. Pennisetum setosum.
21313. Andropogon semiberbis.
21314. Hyparrhenia bracteata.
21316. Panicum polycladum.
21320. Panicum hirtum.
21335. Andropogon lateralis incanus.
21336. Axonopus scoparius.
21353. Aristida marginalis.
21369. Poa aequatoriensis.
21380. Agrostis perennans.
21381. Stipa inconspicua.
21384. Briza mandoniana.
21385. Calamagrostis beyrichiana.
21388. Chusquea serrulata.

HITCHCOCK, A. S.—Continued

21397. Panicum urvilleanum.
21398. Aristida adscensionis.
21399. Bouteloua curtipendula.
21400. Trichloris pluriflora.
21401. Eragrostis cilianensis.
21402. Panicum stramineum.
21403. Chloris virgata.
21404. Aristida adscensionis.
21407. Eragrostis pastoensis.
21408. Aristida schiedeana.
21409. Chloris beyrichiana.
21410. Eragrostis montufari.
21418. Sporobolus purpurascens.
21419. Aegopogon cenchroides.
21420. Panicum stigmosum.
21421. Axonopus compressus.
21430. Briza mandoniana.
21439. Cortaderia nitida.
21444. Triniochloa stipoides.
21454. Isachne arundinacea.
21455. Stipa inconspicua.
21457. Agrostis breviculmis.
21461. Muhlenbergia angustata.
21462. Briza mandoniana.
21463. Sporobolus purpurascens.
21464. Paspalum tenellum.
21465. Axonopus mathewsii.
21466. Agrostis perennans.
21468. Bromus pitensis.
21469. Trachypogon montufari.
21477. Pennisetum intectum.
21478. Lamprothyrsus peruvianus.
21481. Andropogon aequatoriensis.
21482. Pennisetum tristachyum.
21483. Axonopus mathewsii.
21484. Eragrostis pastoensis.
21486. Chaetochloa geniculata.
21487. Briza mandoniana.
21488. Bromus unioloides.
21489. Andropogon hirtiflorus.
21491. Paspalum ceresia.
21495. Paspalum soboliferum.
21506. Cortaderia nitida.
21512. Festuca procera.
21523. Stipa rosea.
21524. Danthonia secundiflora.
21528. Paspalum pallidum.
21530. Danthonia secundiflora.
21531. Briza mandoniana.
21532. Calamagrostis planifolia.
21533. Calamagrostis humboldtiana.
21534. Agrostis perennans.

HITCHCOCK, A. S.—Continued

21535. Calamagrostis humboldtiana.
21536. Paspalum bonplandianum.
21557. Poa aequatoriensis.
21590. Stipa brachyphylla.
21591. Eragrostis pastoensis.
21593. Agrostis tolucensis.
21602. Lolium temulentum arvense.
21605. Stipa inconspicua.
21619. Cortaderia nitida.
21628. Briza mandoniana.
21630. Poa pardoana.
21631. Agrostis perennans.
21632. Triniochloa stipoides.
21639. Briza mandoniana.
21642. Agrostis nigritella.
21643. Agrostis tolucensis.
21647. Agrostis perennans.
21652. Calamagrostis bogotensis.
21654. Calamagrostis tarmensis.
21682. Festuca sublimis.
21689. Calamagrostis humboldtiana.
21690. Cortaderia nitida.
21691. Agrostis tolucensis.
21704. Chaetochloa cernua.
21709. Stipa ibarrensis.
21710. Paspalum humboldtianum.
21711. Bromus pitensis.
21712. Polypogon elongatus.
21713. Andropogon saccharoides parvispiculus.
21714. Agropyron attenuatum.
21715. Cenchrus echinatus.
21716. Stipa ibarrensis.
21718. Bromus pitensis.
21719. Stipa ibarrensis.
21724. Eragrostis lurida.
21728. Eragrostis lurida.
21741. Sporobolus berteroanus.
21742. Eragrostis nigricans.
21745. Stipa ibarrensis.
21749. Paspalum juergensii.
21751. Ischaemum latifolium.
21752. Axonopus scoparius.
21755. Ischaemum latifolium hirtivaginum.
21756. Isachne arundinacea.
21757. Ischaemum latifolium hirtivaginum.
21761. Paspalum saccharoides.
21762. Pennisetum bambusiforme.
21771. Arundinella berteroniana.
21775. Lasiacis sorghoidea.

HITCHCOCK, A. S.—Continued

21799. Panicum laxum.
21806. Lasiacis sorghoidea.
21807. Axonopus scoparius.
21808. Lasiacis sorghoidea.
21809. Panicum sciurotis.
21810. Axonopus scoparius.
21822. Pennisetum peruvianum.
21826. Axonopus scoparius.
21842. Paspalum juergensii.
21853. Pseudechinolaena polystachya.
21856. Lasiacis ligulata.
21858. Ichnanthus pallens.
21862. Panicum hebotes.
21863. Lasiacis ligulata.
21867. Panicum laxum.
21871. Ichnanthus pallens.
21878. Ichnanthus pallens.
21879. Panicum laxum.
21894. Lasiacis oaxacensis.
21895. Chloris radiata.
21900. Stipa mucronata.
21901. Eragrostis pastoensis.
21902. Chaetochloa geniculata.
21903. Eragrostis pilosa.
21908. Axonopus compressus.
21909. Briza mandoniana.
21911. Andropogon condensatus.
21912. Paspalum pilgerianum.
21913. Stipa ibarrensis.
21914. Eragrostis lugens.
21915. Andropogon cirratus.
21916. Oplismenus burmanni.
21919. Andropogon lateralis incanus.
21920. Stipa mucronata.
21921. Muhlenbergia ciliata.
21922. Aegopogon cenchroides.
21923. Festuca megalura.
21926. Festuca procera.
21931. Eragrostis patula.
21932. Eragrostis nigricans.
21944. Festuca dolichophylla.
21948. Poa pardoana.
21948½. Briza mandoniana.
21949. Calamagrostis humboldtiana.
21950. Agrostis nigritella.
21951. Festuca dolichophylla.
21955. Calamagrostis coarctata.
21956. Poa cucullata.
21958. Bromus lanatus.
21967. Poa cucullata.
21968. Calamagrostis ligulata.
21978. Festuca dolichophylla.

HITCHCOCK, A. S.—Continued

21979. Bromus lanatus.
21980. Calamagrostis recta.
21981. Festuca andicola.
21982. Agrostis breviculmis.
21983. Cortaderia sericantha.
21984. Poa cucullata.
21985. Calamagrostis jamesoni.
21986. Poa pardoana.
21993. Agrostis breviculmis.
21994. Festuca dolichophylla.
21999. Agrostis araucana.
21999⅓. Poa subspicata.
21999½. Calamagrostis coarctata.
22002. Agrostis breviculmis.
22003. Bromus lanatus.
22004. Poa pardoana.
22007. Agrostis breviculmis.
22011. Poa annua.
22014. Agrostis breviculmis.
22015. Agrostis tolucensis.
22016. Agrostis tolucensis.
22017. Poa cucullata.
22018. Nassella pubiflora.
22019. Festuca breviaristata.
22020. Calamagrostis coarctata.
22026. Poa subspicata.
22628. Festuca australis.
22629. Trisetum spicatum.
22030. Festuca dolichophylla.
22045. Agrostis breviculmis.
22051. Andropogon bicornis.
22052. Lasiacis sorghoidea.
22053. Lasiacis ruscifolia.
22054. Lasiacis sorghoidea.
22055. Panicum trichanthum.
22056. Olyra heliconia.
22057. Panicum stoloniferum.
22058. Panicum frondescens.
22059. Panicum polygonatum.
22060. Olyra micrantha.
22061. Paspalum decumbens.
22062. Axonopus compressus.
22063. Arundinella berteroniana.
22064. Panicum laxum.
22065. Eleusine indica.
22066. Paspalum decumbens.
22067. Ichnanthus pallens.
22068. Pseudechinolaena polystachya.
22069. Ichnanthus candicans.
22070. Olyra heliconia.
22072. Paspalum paniculatum.
22073. Paspalum virgatum.

HITCHCOCK, A. S.—Continued

22074. Eragrostis ciliaris.
22075. Syntherisma sanguinalis.
22076. Paspalum crassum.
22077. Andropogon condensatus.
22078. Leptochloa domingensis.
22079. Trichachne sacchariflora.
22080. Axonopus scoparius.
22081. Cenchrus hillebrandianus.
22082. Syntherisma sanguinalis.
22083. Hackelochloa granularis.
22086. Axonopus scoparius.
22087. Paspalum multicaule.
22088. Axonopus compressus.
22089. Paspalum conjugatum.
22090. Syntherisma violascens.
22091. Syntherisma violascens.
22092. Syntherisma violascens.
22094. Chaetochloa vulpiseta.
22095. Chaetochloa poiretiana.
22096. Andropogon selloanus.
22097. Chloris radiata.
22098. Paspalum pubifolium.
22099. Panicum laxum.
22100. Leptochloa domingensis.
22101. Panicum trichoides.
22102. Paspalum virgatum.
22103. Arundinella berteroniana.
22104. Oplismenus hirtellus.
22108. Sporobolus berteroanus.
22109. Chaetochloa geniculata.
22110. Cenchrus pauciflorus.
22111. Axonopus capillaris.
22113. Andropogon brevifolius.
22115. Panicum hirticaule.
22116. Lasiacis ligulata.
22117. Oplismenus hirtellus.
22118. Lasiacis sorghoidea.
22119. Lasiacis sorghoidea.
22120. Lasiacis sorghoidea.
22121. Guadua weberbaueri.
22122. Lasiacis sorghoidea.
22123. Gynerium sagittatum.
22124. Panicum polygonatum.
22125. Lasiacis sorghoidea.
22128. Ichnanthus calvescens.
22130. Eragrostis nigricans.
22131. Eragrostis montufari.
22132. Paspalum paniculatum.
22133. Cenchrus hillebrandianus.
22134. Cenchrus pauciflorus.
22135. Muhlenbergia fastigiata.
22136. Calamagrostis densiflora.

HITCHCOCK, A. S.—Continued

22137. Calamagrostis densiflora.
22138. Calamagrostis vicunarum.
22139. Calamagrostis vicunarum.
22140. Calamagrostis rigescens.
22141. Lamprothyrsus peruvianus.
22143. Andropogon lateralis.
22144. Festuca megalura.
22145. Agrostis tolucensis.
22146. Lamprothyrsus peruvianus.
22147. Andropogon hirtiflorus.
22148. Trachypogon montufari.
22149. Pennisetum bambusiforme.
22150. Eragrostis montufari.
22151. Sporobolus berteroanus.
22152. Calamagrostis beyrichiana.
22152½. Polypogon elongatus.
22153. Ichnanthus minarum.
22154. Muhlenbergia tenuissima.
22155. Aegopogon cenchroides.
22156. Andropogon lateralis incanus.
22157. Axonopus scoparius.
22158. Chaetochloa scandens.
22159. Bromus unioloides.
22160. Pennisetum weberbaueri.
22161. Stipa brachyphylla.
22162. Eragrostis lurida.
22163. Eragrostis lurida.
22164. Nassella pubiflora.
22165. Muhlenbergia rigida.
22166. Andropogon saccharoides parvispiculus.
22166½. Andropogon saccharoides perforatus.
22167. Bouteloua simplex.
22168. Aristida adscensionis.
22169. Lycurus phleoides.
22170. Chaetochloa geniculata.
22171. Poa pratensis.
22172. Polypogon lutosus.
22173. Festuca compressifolia.
22174. Stipa ichu.
22175. Poa asperiflora.
22176. Poa fibrifera.
22177. Polypogon lutosus.
22178. Nassella pubiflora.
22179. Festuca rigescens.
22180. Elymus angulatus.
22181. Stipa mucronata.
22182. Muhlenbergia angustata.
22183. Stipa brachyphylla.
22184. Koeleria cristata.
22184½. Trisetum spicatum.

HITCHCOCK, A. S.—Continued

22185. Agropyron attenuatum.
22186. Poa scaberula.
22187. Calamagrostis heterophylla.
22188. Poa candamoana.
22190. Poa annua.
22191. Festuca rigescens.
22192. Calamagrostis brevifolia.
22193. Festuca parvipaniculata.
22194. Festuca rigescens.
22195. Poa subspicata.
22196. Poa candamoana.
22197. Festuca rigescens.
22198. Calamagrostis preslii.
22199. Trisetum spicatum.
22200. Calamagrostis preslii.
22201. Poa subspicata.
22202. Agrostis haenkeana.
22203. Dissanthelium calycinum.
22204. Dissanthelium calycinum.
22205. Agrostis breviculmis.
22206. Calamagrostis vicunarum.
22207. Dissanthelium calycinum.
22209. Calamagrostis brevifolia.
22210. Bromus unioloides.
22211. Stipa mucronata.
22212. Poa candamoana.
22213. Poa candamoana.
22214. Dissanthelium calycinum.
22216. Poa candamoana.
22218. Aciachne pulvinata.
22219. Calamagrostis vicunarum.
22220. Calamagrostis vicunarum.
22221. Calamagrostis eminens.
22222. Calamagrostis rigescens.
22223. Calamagrostis densiflora.
22224. Hordeum murinum.
22225. Calamagrostis vicunarum.
22226. Stipa brachyphylla.
22227. Festuca casapaltensis.
22228. Dissanthelium calycinum.
22229. Calamagrostis vicunarum.
22230. Bromus unioloides.
22231. Bromus pitensis.
22232. Festuca rigescens.
22233. Dissanthelium calycinum.
22234. Festuca rigescens.
22235. Festuca rigescens.
22236. Calamagrostis preslii.
22237. Agrostis breviculmis.
22238. Calamagrostis rigescens.
22239. Festuca rigescens.
22240. Dissanthelium minimum.

HITCHCOCK, A. S.—Continued

22241. Stipa hans-meyeri
22242. Dissanthelium calycinum.
22243. Stipa brachyphylla.
22244. Festuca parvipaniculata.
22245. Festuca parvipaniculata.
22246. Dissanthelium calycinum.
22247. Agrostis breviculmis.
22248. Poa annua.
22249. Aciachne pulvinata.
22250. Calamagrostis podophora.
22251. Poa horridula.
22252. Festuca rigescens.
22253. Calamagrostis brevifolia.
22254. Trisetum spicatum.
22255. Calamagrostis rigescens.
22256. Aciachne pulvinata.
22258. Stipa inconspicua.
22259. Brachypodium mexicanum.
22260. Poa horridula.
22261. Hordeum murinum.
22262. Polypogon lutosus.
22263. Agropyron attenuatum.
22264. Agrostis tolucensis.
22265. Poa horridula.
22266. Poa trivialis.
22267. Elymus angulatus.
22268. Bromus pitensis.
22269. Trisetum spicatum.
22270. Festuca dolichophylla.
22271. Trisetum spicatum.
22272. Bromus pitensis.
22273. Calamagrostis tarmensis.
22274. Calamagrostis heterophylla.
22275. Calamagrostis brevifolia.
22276. Festuca dolichophylla.
22277. Poa trivialis.
22278. Elymus angulatus.
22279. Poa trivialis.
22280. Poa horridula.
22281. Festuca dolichophylla.
22282. Festuca rigescens.
22283. Calamagrostis recta.
22284. Calamagrostis heterophylla.
22285. Paspalum pilgerianum.
22286. Polypogon lutosus.
22287. Festuca australis.
22288. Poa candamoana.
22289. Poa candamoana.
22290. Bromus unioloides.
22291. Agrostis araucana.
22292. Stipa inconspicua.
22293. Stipa inconspicua.

HITCHCOCK, A. S.—Continued

22294. Trisetum spicatum.
22295. Stipa inconspicua.
22296. Agrostis verticillata.
22297. Agropyron attenuatum.
22298. Brachypodium mexicanum.
22299. Stipa mucronata.
22300. Festuca rigescens.
22301. Calamagrostis rigescens.
22302. Poa horridula.
22302. Lamprothyrsus peruvianus.
22303. Lamprothyrsus peruvianus
22304. Lamprothyrsus peruvianus.
22305. Calamagrostis fuscata.
22306. Cortaderia rudiuscula.
22307. Stipa mucronata.
22308. Muhlenbergia angustata.
22309. Festuca australis.
22310. Agrostis tolucensis.
22311. Stipa inconspicua.
22312. Bromus pitensis.
22313. Festuca compressifolia.
22314. Calamagrostis recta.
22315. Calamagrostis recta.
22316. Poa horridula.
22318. Calamagrostis recta.
22319. Elymus angulatus.
22320. Agrostis breviculmis.
22321. Agrostis tolucensis.
22322. Poa horridula.
22323. Trisetum spicatum.
22324. Bromus unioloides.
22325. Bromus pitensis.
22326. Bromus pitensis.
22327. Calamagrostis humboldtiana.
22328. Festuca dolichophylla.
22329. Agropyron breviaristatum.
22330. Agrostis perennans.
22331. Agrostis gelida.
22332. Calamagrostis eminens.
22333. Polypogon lutosus.
22334. Alopecurus bracteatus.
22335. Poa candamoana.
22336. Cortaderia rudiuscula.
22337. Polypogon lutosus.
22337½. Agrostis verticillata.
22338. Paspalum racemosum.
22339. Eriochloa ramosa.
22340. Polypogon elongatus.
22341. Bromus unioloides.
22342. Echinochloa crusgalli crus-pavonis.
22343. Cynodon dactylon.

HITCHCOCK, A. S.—Continued

22344. Poa annua.
22345. Chloris radiata.
22346. Phalaris minor.
22347. Holcus halepensis.
22348. Holcus halepensis.
22349. Cenchrus humilis.
22350. Stipa nardoides.
22351. Eragrostis peruviana.
22352. Nazia aliena.
22353. Sporobolus virginicus.
22386. Bromus striatus.
22387. Festuca megalura.
22423. Koeleria trachycantha.
22424. Eragrostis attenuata.
22426. Lolium temulentum.
22427. Briza minor.
22428. Echinochloa crusgalli crus-pavonis.
22429. Distichlis spicata.
22430. Bromus unioloides.
22431. Polypogon elongatus.
22432. Polypogon elongatus.
22433. Polypogon lutosus.
22434. Sporobolus berteroanus.
22436. Poa annua.
22437. Agrostis verticillata.
22438. Nassella pubiflora.
22439. Pennisetum clandestinum.
22442. Poa candamoana.
22443. Poa horridula.
22444. Stipa brachyphylla.
22445. Calamagrostis vicunarum.
22446. Nassella pubiflora.
22447. Stipa ichu.
22448. Muhlenbergia fastigiata.
22449. Pennisetum clandestinum.
22450. Distichlis humilis.
22451. Poa annua.
22452. Stipa inconspicua.
22453. Festuca rigescens.
22454. Avena sterilis.
22455. Festuca orthophylla.
22457. Hordeum vulgare.
22458. Poa horridula.
22459. Poa horridula.
22460. Stipa ichu.
22461. Melica scabra.
22462. Agropyron breviaristatum.
22463. Eragrostis lurida.
22465. Aegopogon cenchroides.
22467. Bromus unioloides.
22469. Poa candamoana.

HITCHCOCK, A. S.—Continued

22471. Trisetum spicatum.
22472. Lolium temulentum arvense.
22474. Festuca megalura.
22475. Cortaderia rudiuscula.
22476. Polypogon lutosus.
22477. Poa horridula.
22478. Bromus unioloides.
22479. Poa horridula.
22480. Trisetum spicatum.
22481. Nassella pubiflora.
22482. Brachypodium mexicanum.
22483. Stipa mucronata.
22484. Agrostis araucana.
22485. Paspalum humboldtianum.
22486. Eragrostis lurida.
22487. Polypogon elongatus.
22488. Brachypodium mexicanum.
22489. Bromus unioloides.
22490. Eragrostis montufari.
22491. Bouteloua simplex.
22492. Chloris beyrichiana.
22495. Bromus trinii.
22495½. Poa annua.
22496. Avena sterilis.
22497. Eragrostis nigricans.
22498. Eragrostis nigricans.
22499. Andropogon saccharoides parvispiculus.
22500. Eragrostis lurida.
22501. Poa candamoana.
22502. Stipa neesiana.
22503. Nassella publiflora.
22505. Stipa mucronata.
22506. Festuca megalura.
22507. Sporobolus beteroanus.
22508. Polypogon lutosus.
22509. Chaetochloa geniculata.
22510. Stipa neesiana.
22511. Pennisetum weberbaueri.
22513. Poa horridula.
22514. Stipa inconspicua.
22515. Axonopus elegantulus.
22517. Eragrostis lugens.
22518. Eragrostis lurida.
22519. Eragrostis lurida.
22520. Sporobolus berteroanus.
22521. Cortaderia rudiuscula.
22522. Eragrostis pastoensis.
22523. Nassella publiflora.
22526. Andropogon cirratus.
22527. Stipa ichu.
22530. Bromus pitensis.

HITCHCOCK, A. S.—Continued

22531. Bromus pitensis.
22532. Festuca ulochaeta.
22533. Agrostis gelida.
22534. Agrostis tolucensis.
22535. Trisetum spicatum.
22538. Agropyron breviaristatum.
22539. Agrostis tolucensis.
22540. Poa scaberula.
22551. Eragrostis nigricans.
22552. Chloris beyrichiana.
22553. Aristida adscensionis.
22554. Eragrostis lurida.
22556. Stipa mucronata.
22557. Stipa plumosa.
22558. Stipa ichu.
22559. Poa buchtienii.
22560. Festuca rigescens.
22561. Bromus unioloides.
22562. Bromus unioloides.
22563. Trisetum spicatum.
22564. Koeleria cristata.
22565. Melica adhaerans.
22566. Hordeum murinum.
22567. Poa buchtienii.
22568. Festuca dolichophylla.
22569. Polypogon elongatus.
22570. Poa buchtienii.
22571. Poa buchtienii.
22572. Poa pratensis.
22573. Cortaderia rudiuscula.
22574. Poa annua.
22575. Lolium perenne.
22576. Polypogon lutosus.
22577. Stipa mucronata.
22578. Nassella pubiflora.
22579. Nassella pubiflora.
22580. Stipa mucronata.
22581. Stipa ichu.
22582. Bromus unioloides.
22583. Pennisetum chilense.
22584. Chloris beyrichiana.
22585. Alopecurus bracteatus.
22586. Muhlenbergia ligularis.
22587. Poa asperiflora.
22589. Poa asperiflora.
22590. Calamagrostis glacialis.
22591. Calamagrostis ovata.
22592. Aciachne pulvinata.
22593. Nassella pubiflora.
22594. Sporobolus argutus.
22595. Nassella pubiflora.
22596. Muhlenbergia ligularis.

HITCHCOCK, A. S.—Continued

22596½. Dissanthelium calycinum.
22597. Paspalum candidum.
22598. Poa scaberula.
22599. Polypogon elongatus.
22600. Agrostis tolucensis.
22601. Calamagrostis montevidensis.
22602. Triniochloa stipoides.
22603. Aegopogon bryophilus.
22604. Sporobolus berteroanus.
22605. Paspalum lepidum.
22606. Syntherisma sanguinalis.
22607. Cortaderia rudiuscula.
22608. Axonopus scoparius.
22609. Paspalum inconstans.
22610. Ichnanthus pallens.
22611. Bromus unioloides.
22612. Paspalum penicillatum.
22613. Eragrostis montufari.
22614. Panicum cordovense.
22615. Andropogon saccharoides parvispiculus.
22616. Lasiacis ligulata.
22617. Andropogon bicornis.
22618. Andropogon condensatus.
22619. Ichnanthus minarum.
22620. Ichnanthus pallens.
22621. Panicum cordovense.
22622. Muhlenbergia tenuissima.
22623. Eragrostis montufari.
22624. Paspalum paniculatum.
22625. Axonopus fissifolius.
22626. Panicum laxum.
22627. Paspalum paniculatum.
22628. Sporobolus berteroanus.
22629. Pseudechinolaena polystachya.
22631. Ichnanthus pallens.
22632. Oplismenus hirtellus.
22633. Paspalum conjugatum.
22634. Chaetochloa geniculata.
22635. Chloris distichophylla.
22636. Andropogon condensatus.
22637. Andropogon condensatus.
22638. Panicum sellowii.
22639. Andropogon condensatus.
22640. Paspalum buchtienii.
22641. Ichnanthus pallens.
22642. Andropogon leucostachyus.
22643. Paspalum penicillatum.
22644. Eragrostis pilosa.
22646. Chaetochloa geniculata.
22647. Panicum cordovense.
22648. Paspalum buchtienii.

HITCHCOCK, A. S.—Continued

22649. Nazia aliena.
22650. Gouinia latifolia.
22651. Andropogon altus.
22652. Lasiacis sorghoidea.
22653. Ichnanthus calvescens.
22654. Axonopus fissifolius.
22655. Hackelochloa granularis.
22656. Andropogon condensatus.
22657. Axonopus capillaris.
22658. Andropogon hirtiflorus.
22659. **Andropogon hassleri.**
22660. Panicum trichanthum.
22661. Pennisetum setosum.
22662. Axonopus scoparius.
22663. Chloris distichophylla.
22664. Paspalum buchtienii.
22665. Trichachne sacchariflora.
22666. Eriochloa punctata.
22667. Panicum laxum.
22668. Panicum laxum.
22669. Panicum sciurotis.
22670. Ichnanthus candicans.
22671. Axonopus compressus.
22672. Paspalum inaequivalve.
22673. Brachiaria plantaginea.
22674. Syntherisma violascens.
22675. Paspalum plicatulum.
22676. Aristida circinalis.
22677. Chloris distichophylla.
22678. Heteropogon melanocarpus.
22679. Chloris radiata.
22680. Eragrostis lugens.
22681. Eragrostis bahiensis.
22682. Erianthus trinii.
22683. Gynerium sagittatum.
22684. Eragrostis montufari.
22685. Chaetochloa tenax.
22686. Paspalum saccharoides.
22687. Pennisetum tristachyum boliviense.
22688. Cenchrus echinatus.
22689. Chloris polydactyla.
22690. Chloris polydactyla.
22691. Paspalum inaequivalve.
22692. Leptochloa domingensis.
22693. Echinochloa crusgalli crus-pavonis.
22694. Thrasya campylostachya.
22695. Ichnanthus minarum.
22696. Paspalum virgatum.
22697. Panicum sellowii.
22698. Chloris polydactyla.

HITCHCOCK, A. S.—Continued

22699. Ichnanthus calvescens.
22700. Axonopus scoparius.
22701. Cortaderia rudiuscula.
22702. Aristida riparia.
22703. Axonopus chrysoblepharis.
22704. Hyparrhenia bracteata.
22705. Andropogon altus.
22706. Heteropogon melanocarpus.
22707. Andropogon condensatus.
22708. Eragrostis lugens.
22709. Panicum sciurotis.
22710. Eragrostis lugens.
22711. Aristida circinalis.
22712. Panicum polygonatum.
22713. Ichnanthus minarum.
22714. Chaetochloa poiretiana.
22715. Ichnanthus peruvianus.
22716. Axonopus fissifolius.
22717. Chaetochloa tenacissima.
22718. Paspalum decumbens.
22719. Chaetochloa poiretiana.
22720. Olyra heliconia.
22721. Tripsacum dactyloides.
22722. Paspalum paniculatum.
22723. Paspalum collinum.
22724. Arundo donax.
22725. Chusquea scandens.
22726. Paspalum lepidum.
22727. Eragrostis lugens.
22728. Thrasya campylostachya.
22729. Pennisetum tristachyum boliviense.
22730. Paspalum distichum.
22732. Paspalum cordovense.
22733. Thrasya campylostachya.
22734. Paspalum inconstans.
22735. Polypogon elongatus.
22736. Chloris distichophylla.
22737. Erianthus angustifolius.
22738. Panicum sciurotis.
22739. Ichnanthus candicans.
22740. Chaetochloa scandens.
22741. Ichnanthus peruvianus.
22742. Chusquea scandens.
22744. Chusquea peruviana.
22745. Chusquea peruviana.
22746. Chusquea peruviana.
22747. Chusquea scandens.
22748. Chusquea delicatula.
22749. Chusquea delicatula.
22750. Chusquea serrulata.
22751. Zeugites mexicana.

HITCHCOCK, A. S.—Continued

22752. Panicum sellowii.
22753. Chusquea uniflora.
22754. Poa horridula.
22755. Agrostis tolucensis.
22756. Aphanelytrum procumbens.
22757. Agrostis perennans.
22758. Pariana lunata.
22759. Poa myriantha.
22760. Festuca megalura.
22761. Poa scaberula.
22762. Bromus pitensis.
22763. Muhlenbergia ligularis.
22764. Agrostis haenkeana.
22765. Poa candamoana.
22766. Agropyron attenuatum.
22767. Koeleria cristata.
22768. Alopecurus bracteatus.
22769. Poa candamoana.
22770. Agrostis tolucensis.
22771. Stipa inconspicua.
22772. Paspalum pygmaeum.
22773. Briza mandoniana.
22774. Poa asperiflora.
22775. Festuca sublimis.
22776. Bromus pitensis.
22777. Stipa hans-meyeri.
22778. Festuca dolichophylla.
22779. Agrostis araucana.
22780. Cortaderia bifida.
22781. Agrostis gelida.
22782. Poa horridula.
22783. Aciachne pulvinata.
22784. Agrostis stolonifera.
22785. Stipa ichu.
22786. Festuca orthophylla.
22787. Sporobolus argutus.
22788. Chloris virgata.
22789. Chloris beyrichiana.
22790. Paspalum distichum.
22791. Distichlis spicata.
22792. Polypogon lutosus.
22793. Paspalum distichum.
22794. Andropogon saccharoides.
22794½. Andropogon saccharoides parvispicula.
22795. Paspalum humboldtianum.
22796. Chloris polydactyla.
22797. Chloris polydactyla.
22798. Eragrostis montufari.
22799. Stipa mucronata.

HITCHCOCK, A. S.—Continued

22800. Stipa inconspicua.
22801. Sporobolus berteroanus.
22802. Chaetochloa geniculata.
22803. Chaetochloa argentina,
22804. Eragrostis pilosa.
22805. Echinochloa crusgalli crus-pavonis.
22806. Cenchrus myosuroides.
22807. Paspalum remotum.
22808. Agrostis verticillata.
22809. Bouteloua curtipendula.
22810. Bromus unioloides.
22811. Chloris beyrichiana.
22812. Stipa ichu.
22813. Polypogon elongatus.
22814. Aira conferta.
22814½. Calamagrostis montevidensis.
22815. Lycurus phleoides.
22816. Chloris beyrichiana.
22817. Aristida adscensionis.
22818. Muhlenbergia ligularis.
22819. Bouteloua simplex.
22820. Aegopogon cenchroides.
22821. Eragrostis lugens.
22822. Lycurus phleoides.
22823. Andropogon saccharoides laguroides.
22824. Microchloa indica.
22825. Paspalum ceresia.
22826. Lamprothyrsus hieronymi.
22827. Pennisetum chilense.
22828. Cortaderia rudiuscula.
22829. Festuca megalura.
22830. Paspalum humboldtianum.
22831. Trachypogon montufari.
22833. Stipa inconspicua.
22834. Sporobolus argutus.
22835. Eragrostis montufari.
22836. Avena fatua.
22837. Lolium temulentum arvense.
22838. Calamagrostis lilloi.
22839. Syntherisma sanguinalis.
22840. Distichlis spicata.
22841. Distichlis spicata.
22842. Chloris virgata.
22843. Aegopogon cenchroides.
22844. Eragrostis cilianensis.
22845. Chloris beyrichiana.
22846. Eragrostis pilosa.
22847. Pennisetum latifolium.

HITCHCOCK, A. S.—Continued

22848. Agrostis verticillata.
22849. Polypogon lutosus.
22850. Stipa neesiana.
22851. Andropogon saccharoides parvispiculus.
22852. Cortaderia rudiuscula.
22853. Eragrostis lugens.
22854. Stipa inconspicua.
22855. Brachypodium mexicanum.
22856. Lamprothyrsus hieronymi.
22858. Pennisetum chilense.
22859. Poa scaberula.
22860. Poa scaberula.
22861. Eragrostis montufari.
22862. Muhlenbergia rigida.
22863. Lycurus phleoides.
22864. Poa annua.
22865. Poa scaberula.
22866. Paspalum bolivianum.
22867. Eragrostis pilosa.
22869. Eragrostis lurida.
22870. Stipa plumosa.
22871. Festuca orthophylla.
22872. Stipa ichu.
22873. Calamagrostis curvula.
22874. Distichlis humilis.
22876. Distichlis humilis.
22877. Bromus unioloides.
22878. Puccinellia parvula.
22879. Puccinellia oresigena.
22880. Stipa inconspicua.
22882. Paspalum distichum.
22883. Distichlis spicata.
22884. Distichlis spicata.
22885. Distichlis spicata.
22886. Distichlis spicata
22887. Hordeum murinum.
22888. Distichlis spicata.
22889. Eragrostis nigricans.
22890. Cortaderia rudiuscula.
22891. Sporobolus asperifolius.
22892. Elymus angulatus.
22893. Polypogon lutosus.
22894. Bromus unioloides.
22895. Cortaderia rudiuscula.
22896. Cortaderia rudiuscula.
22897. Distichlis spicata.
22898. Pennisetum chilense.
22899. Bromus unioloides.

HITCHCOCK, A. S.—Continued

22900. Eragrostis pilosa.
22921. Distichlis spicata.
22922. Eragrostis pilosa.
22923. Elymus angulatus.
22924. Hordeum murinum.
22926. Stipa inconspicua.
22928. Eragrostis nigricans.
22930. Festuca rigescens.
22931. Poa pardoana.

HOLMGREN, T.

58. Paspalum conjugatum.
86. Panicum frondescens.
113. Panicum trichanthum.
166. Bromus lanatus.
298. Bromus lanatus.
332. Andropogon condensatus.
527. Stipa neesiana.
553. Trisetum andinum.
570. Alopecurus aequalis.
575. Polypogon elongatus.
597. Paspalum bonplandianum.
598. Poa pardoana.
649. Aphanelytrum procumbens.
859. Pseudechinolaena polystachya.
860. Oplismenus burmanni.

HOLWAY, E. D. W., AND MARY M.

321. Trichachne saccharata.
322. Chloris beyrichiana.
323. Echinochloa crusgalli crus-pavonis.
325. Andropogon saccharoides perforatus.
328. Stipa neesiana.
330. Stipa ichu.
331. Paspalum bolivianum.
336. Paspalum remotum.
342. Stipa ichu.
345. Stipa ichu.
346. Festuca dolichophylla.
346½. Bromus lanatus.
348. Chaetochloa geniculata.
350. Distichlis spicata.
351. Sporobolus berteroanus.
356. Eragrostis pilosa.
359. Bouteloua simplex.
361. Microchloa indica.
362. Stipa ichu.

HOLWAY, E. D. W., AND MARY M.—Con.

367. Pappophorum mucronulatum.
368. Trichachne saccharata.
372. Eragrostis pilosa.
374½. Paspalum bolivianum.
377. Eragrostis montufari.
379. Calamagrostis leiophylla.
380. Stipa holwayi.
382. Bromus lanatus.
383. Briza stricta.
384. Melica adhaerans.
387. Stipa ichu.
389. Stipa ichu.
392. Andropogon saccharoides parvispiculus.
393. Bouteloua curtipendula.
398. Stipa inconspicua.
399. Stipa ichu.
409. Brachypodium mexicanum.
412. Echinochloa crusgalli crus-pavonis.
415. Bromus unioloides.
418. Nassella pubiflora.
419. Nassella pubiflora.
421. Poa annua.
423. Stipa mucronata.
427. Agropyron attenuatum.
429. Bromus unioloides.
430. Nassella pubiflora.
433. Stipa brachyphylla.
438. Pennisetum chilense.
449. Nassella pubiflora.
451. Stipa ichu.
456. Bromus unioloides.
457. Melica adhaerans.
460. Festuca dolichophylla.
461. Stipa inconspicua.
463. Eragrostis lugens.
464. Nassella pubiflora.
470. Andropogon saccharoides.
471. Bromus unioloides.
473. Festuca dolichophylla.
474. Hordeum murinum.
476. Nassella pubiflora.
477. Festuca dolichophylla.
478. Trisetum spicatum.
478½. Calamagrostis heterophylla.
479. Nassella pubiflora.
481. Sporobolus berteroanus.
483. Festuca rigescens.
484. Calamagrostis rigescens.
489. Aristida adscensionis.

HOLWAY, E. D. W., AND MARY M.—Con.

490. Microchloa indica.
491. Festuca rigescens.
492. Stipa depauperata.
495. Hordeum murinum.
496. Poa horridula.
497. Nassella pubiflora.
503. Pennisetum latifolium.
507. Paspalum prostratum.
507½. Paspalum penicillatum.
508. Stipa inconspicua.
511. Stipa mucronata.
514. Muhlenbergia rigida.
516. Paspalum bolivianum.
519. Festuca dolichophylla.
529. Stipa ichu.
530. Muhlenbergia holwayorum.
535. Aegopogon cenchroides.
537. Pennisetum mutilatum.
539. Eragrostis nigricans.
541. Ichnanthus minarum.
544. Brachypodium mexicanum.
547. Piptochaetium tuberculatum.
552. Bromus pitensis.
583. Calamagrostis heterophylla.
597. Stipa ichu.
600. Stipa inconspicua.
604. Festuca rigescens.
666. Axonopus scoparius.
677. Chloris distichophylla.
678. Paspalum buchtienii.
679. Andropogon condensatus.
680. Paspalum paniculatum.
686. Andropogon bicornis.
686½. Andropogon condensatus.
687. Pennisetum setosum.
697. Paspalum penicillatum.
703. Paspalum virgatum.
708. Axonopus chrysoblepharis.
709. Andropogon altus.
712. Paspalum buchtienii.
713. Andropogon hirtiflorus.
714. Pennisetum setosum.
719. Paspalum buchtienii.
721. Chloris polydactyla.
726. Paspalum paniculatum.
736. Ichnanthus minarum.
744. Nassella pubiflora.
746. Melica scabra.
747. Bromus unioloides.
763. Stipa mucronata.
770. Aristida adscensionis.

HOLWAY, E. D. W., AND MARY M.—Con.

771. Aristida adscensionis.
781. Paspalum distichum.
782. Paspalum humboldtianum.
783. Andropogon saccharoides perforatus.
785. Echinochloa crusgalli crus-pavonis.
786. Paspalum haenkeanum.
790. Panicum barbinode.
801. Lasiacis ruscifolia.
823. Paspalum racemosum.
824. Syntherisma aequatoriensis.
862. Sporobolus berteroanus.
864. Bromus unioloides.
867. Arundo donax.
869. Agropyron attenuatum.
876. Andropogon hirtiflorus.
886. Brachypodium mexicanum.
901. Bromus unioloides.
903. Andropogon saccharoides parvispiculus.
907. Stipa ibarrensis.
909. Paspalum penicillatum.
914. Aegopogon cenchroides.
928. Polypogon elongatus.
945. Pennisetum tristachyum.
952. Muhlenbergia angustata.
953. Briza mandoniana.
954. Paspalum pallidum.
958. Polypogon elongatus.
1002. Olyra latifolia.

JAMESON, W.

21. Calamagrostis jamesoni.
58. Pereilema crinitum.
92. Neurolepis aristata.
93. Cortaderia sericantha.
95. Calamagrostis ligulata.
97. Calamagrostis ligulata.
105. Chaetochloa geniculata.
107. Aristida spadicea.
159. Calamagrostis rigescens.
162. Eragrostis mexicana.
163. Poa horridula.
168. Aphanelytrum procumbens.
186. Chaetochloa geniculata.
190. Calamagrostis recta.
191. Festuca sublimis.
200. Lasiacis ligulata.
229. Agrostis araucana.
245. Cenchrus echinatus.

JAMESON, W.—Continued

248. Muhlenbergia microsperma.
249. Eragrostis nigricans.
251. Stipa milleana.
253. Chaetochloa cernua.
257. Festuca australis.
269. Aphanelytrum procumbens.
302. Agrostis tolucensis.
304. Festuca australis.
305. Agropyron attenuatum.
306. Agropyron attenuatum.
316. Andropogon glaucescens.
320. Andropogon saccharoides parvispicula.
343. Syntherisma sanguinalis.
346. Echinochloa colonum.
347. Isachne rigens.
349. Chloris radiata.
350. Anthephora hermaphrodita.
356. Ichnanthus pallens.
365. Oplismenus burmanni.
367. Bouteloua pilosa.
371. Paspalum microstachyum.
372. Chaetochloa membranifolia.
385. Syntherisma digitata.
393. Chloris angustiflora.
396. Oplismenus hirtellus.
417. Polypogon elongatus.
431. Calamagrostis rigescens.
540. Paspalum repens.
541. Eragrostis glomerata.
552. Paspalum microstachyum.
556. Axonopus compressus.
560. Panicum trichanthum.
568. Panicum megiston.
578. Sporobolus argutus.
587. Lasiacis ruscifolia.
630. Chusquea scandens.
630. Aegopogon cenchroides.
692. Ichnanthus candicans.
694. Poa horridula.
703. Lasiacis sorgholdea.
725. Chaetochloa sulcata.
735. Arundinella berteroniana.
739. Pharus glaber.
745. Panicum trichoides.
746. Panicum laxum.
762. Axonopus scoparius.
764. Homolepis aturensis.
779. Briza mandoniana.
798. Calamgrostis rigescens.
836. Calamagrostis ligulata.

JELSKI, C. DE

392. Poa subspicata.
403. Panicum obtusiglume.
487. Paspalum penicillatum.
582. Paspalum penicillatum.
582. Paspalum pygmaeum.
583. Lasiacis ligulata.
589. Bouteloua curtipendula.
590. Melica scabra.

LECHLER, W.

1728. Sporobolus berteroanus.
1734. Poa horridula.
1735. Stipa peruviana.
1736. Nassella pubiflora.
1756. Calamagrostis heterophylla.
1774. Aristida enodis.
1792. Bouteloua simplex.
1800. Calamagrostis antoniana.
1809. Calamagrostis heterophylla.
1813. Aciachne pulvinata.
1813b. Muhlenbergia peruviana.
1827. Calamagrostis ovata.
1829. Festuca rigescens.
1832. Dissanthelium calycinum.
1836. Dissanthelium minimum.
1843. Calamagrostis humboldtiana.
1960. Andropogon condensatus.
1862. Paspalum candidum.
1925. Pennisetum latifolium.
1930. Andropogon hirtiflorus.
1952. Andropogon saccharoides perforatus.
1965. Calamagrostis chrysantha.
1978. Stipa hans-meyeri.
1981. Calamagrostis rigescens.
2057. Calamagrostis ovata.
2058. Poa horridula.
2142. Calamagrostis fuscata.
2148. Saccharum officinarum.
2154. Chusquea spicata.
2180. Panicum pulchellum.
2187. Ichnanthus pallens.
2219. Lasiacis ligulata.
2275. Paspalum conjugatum.
2284. Axonopus capillaris.
2285. Panicum laxum.
2310. Pharus glaber.
2399. Trichachne saccharifiora.
2427. Arundinella berteroniana.
2430. Panicum sellowii.
2432. Orthoclada laxa.

LECHLER, W.—Continued

2478. Chloris radiata.
2604. Agrostis haenkeana.
2640. Chusquea spicata.
2640a. Agrostis perennans.
2675. Ichnanthus panicoides.
2682. Poa horridula.
2694. Chusquea spicata.
2695. Calamagrostis recta.
3234. Aciachne pulvinata.
3235. Olyra micrantha.
3304. Calamagrostis recta.
3305. Olyra micrantha.

LEHMANN, F. C.

442a. Eragrostis tenax.
467. Chaetochloa geniculata.
473. Chusquea scandens.
491a. Poa cucullata.
493. Festuca breviaristata.
4400. Streptochaeta sodiroana.
5284. Polypogon lutosus.
5285. Chaetochloa geniculata.
5286. Stipa ibarrensis.
5286a. Festuca megalura.
5392. Stipa ichu.
5394. Pennisetum tristachyum.
5744. Panicum barbinode.
5745. Panicum maximum.
5746. Panicum frondescens.
6552. Pharus latifolius.
7687. Pennisetum tristachyum.
8025. Poa cucullata.

MACBRIDE, J. F.

2876. Cottea pappophoroides.
2926. Eragrostis patula.
2936. Cortaderia rudiuscula.
2969. Poa candamoana.
3001. Poa asperiflora.
3045. Festuca dichoclada.
3078. Alopecurus aequalis.
3170. Bouteloua curtipendula.
3176. Stipa macbridei.
3177. Aristida adscensionis.
3217. Muhlenbergia microsperma.
3238. Pappophorum alopecuroideum.
3239. Heteropogon contortus.
3240. Cottea pappophoroides.
3241. Bouteloua simplex.
3258. Festuca compressifolia.
3270. Axonopus elegantulus.

MACBRIDE, J. F.—Continued

3315. Sporobolus lasiophyllus.
3316. Briza mandoniana.
3317. Festuca compressifolia.
3320. Muhlenbergia rigida.
3322. Calamagrostis fuscata.
3323. Andropogon lateralis incanus.
3324. Axonopus elegantulus.
3325. Andropogon hirtiflorus.
3331. Chloris beyrichiana.
3350. Triniochloa stipoides.
3362. Festuca dolichophylla.
3363. Poa fibrifera.
3364. Calamagrostis fuscata.
3365. Cinna poaeformis.
3376. Muhlenbergia ciliata.
3401. Muhlenbergia peruviana.
3428. Avena sterilis.
3429. Hordeum vulgare.
3430. Trachypogon montufari.
3511. Aristida adscensionis.
3513. Aristida adscensionis.
3514. Muhlenbergia microsperma.
3516. Eragrostis patula.
3518. Andropogon condensatus.
3526. Panicum hirticaule.
3584. Agrostis gelida.
3621. Zeugites mexicana.
3670. Ichnanthus minarum.
3682. Ichnanthus minarum.
3684. Muhlenbergia ciliata.
3760. Axonopus elegantulus.
3761. Axonopus scoparius.
3778. Chusquea scandens.
3779. Pariana lunata.
3863. Axonopus scoparius.
3874. Muhlenbergia flexuosa.
4052. Axonopus scoparius.
4068. Trachypogon plumosus.
4069. Eragrostis magna.
4073. Sporobolus lasiophyllus.
4205. Muhlenbergia flexuosa.
4250. Lasiacis ligulata.
4251. Oplismenus hirtellus.
4354. Poa fibrifera.
4356. Poa subspicata.
4357. Agrostis tolucensis.
4365. Lasiacis ruscifolia.
4396. Agrostis perennans.
4512. Arundinaria patula.
4563. Lasiacis ruscifolia.
4571. Lasiacis sorghoidea.

MACBRIDE, J. F.—Continued

4572. Olyra heliconia.
4904. Festuca dolichophylla.
4990. Olyra lateralis.
5026. Oplismenus hirtellus.
5027. Ichnanthus axillaris.
5048. Isachne arundinacea.
5101. Panicum glutinosum.
5152. Calamagrostis montevidensis.
5230. Eleusine indica.
5251. Gynerium sagittatum.
5298. Lasiacis sorghoidea.
5302. Lasiacis ligulata.
5309. Panicum trichanthum.
5354. Pseudechinolaena polystachya.
5357. Arundinella berteroniana.
5451. Trichachne sacchariflora.
5452. Hackelochloa granularis.
5475. Pariana zingiberina.
5521. Olyra latifolia.
5535. Ichnanthus calvescens.
5609. Axonopus capillaris.
5646. Panicum frondescens.
5871. Koeleria trachycantha.
5874. Eragrostis peruviana.
5906. Poa annua.
5925. Eragrostis peruviana.
5954. Eragrostis mexicana.

MACBRIDE, J. F., AND FEATHERSTONE, WILLIAM

47. Distichlis spicata.
47a. Sporobolus virginicus.
135. Paspalum flavum.
136. Avena barbata.
137. Stipa plumosa.
164. Eragrostis pilosa.
186. Aegopogon bryophilus.
219. Bouteloua simplex.
220. Aristida adscensionis.
221. Hordeum murinum.
222. Chloris virgata.
223. Eragrostis nigricans.
224. Eragrostis mexicana.
225. Eragrostis pilosa.
226. Festuca megalura.
227. Bromus trinii.
228. Nassella pubiflora.
231. Bromus trinii.
251. Eragrostis lurida.
252. Eragrostis lurida.
253. Bromus unioloides.

MACBRIDE, J. F., AND FEATHERSTONE, WILLIAM—Continued

254. Stipa ichu.
255. Andropogon saccharoides perforatus.
256. Pennisetum weberbaueri.
280. Pennisetum annuum.
281. Melica scabra.
289. Chaetochloa geniculata.
303. Eragrostis weberbaueri.
329. Tripogon spicatus.
334. Festuca compressifolia.
335. Stipa ichu.
342. Aristida adscensionis.
343. Nazia aliena.
356. Paspalum pallidum.
358. Muhlenbergia rigida.
359. Calamagrostis heterophylla.
365. Melica scabra.
367. Poa fibrifera.
377. Polypogon lutosus.
378. Stipa mucronata.
378a. Bromus trinii.
392. Muhlenbergia microsperma.
393. Eragrostis pilosa.
439. Calamagrostis heterophylla.
440. Poa fibrifera.
448. Microchloa indica.
450. Muhlenbergia peruviana.
451. Eragrostis pilosa.
452. Stipa macbridei.
453. Pennisetum rupestre.
454. Melica scabra.
506. Paspalum conjugatum.
517. Paspalum humboldtianum.
524. Cynodon dactylon.
540. Cenchrus myosuroides.
543. Aristida adscensionis.
546. Eriochloa punctata.
549. Cenchrus echinatus.
551. Eragrostis pilosa.
552. Chloris radiata.
553. Manisuris fasciculata.
628. Dissanthelium minimum.
629. Poa asperiflora.
643. Bromus pitensis.
644. Stipa ichu.
645. Stipa ichu.
646. Poa horridula.
647. Bromus unioloides.
648. Stipa inconspicua.
649. Festuca dolichophylla.
650. Elymus angulatus.

MACBRIDE, J. F., AND FEATHERSTONE, WILLIAM—Continued

651. Bromus unioloides.
652. Calamagrostis heterophylla.
653. Festuca megalura.
669. Stipa brachyphylla.
707. Poa horridula.
731. Nassella pubiflora.
751. Hordeum halophilum.
765. Muhlenbergia rigida.
785. Calamagrostis brevifolia.
786. Calamagrostis rigescens.
787. Calamagrostis vicunarum.
800. Muhlenbergia peruviana.
801. Bromus lanatus.
802. Calamagrostis heterophylla.
803. Stipa hans-meyeri.
803a. Stipa featherstonei.
804. Paspalum pygmaeum.
825. Anthochloa lepidula.
851. Trisetum floribundum.
854. Bromus villosissimus.
864. Calamagrostis chrysantha.
903. Calamagrostis humboldtiana.
916. Muhlenbergia peruviana.
933. Dissanthelium calycinum.
948. Calamagrostis vicunarum.
949. Festuca compressifolia.
950. Festuca dolichophylla.
951. Calamagrostis humboldtiana.
952. Stipa ichu.
956. Nassella pubiflora.
957. Agropyron attenuatum.
981. Festuca rigescens.
983. Aristida enodis.
984. Muhlenbergia peruviana.
987. Eragrostis lurida.
994. Andropogon hirtiflorus.
998. Calamagrostis heterophylla.
1031. Sporobolus berteroanus.
1065. Nassella pubiflora.
1066. Festuca compressifolia.
1067. Calamagrostis humboldtiana.
1105. Calamagrostis humboldtiana.
1112. Festuca rigescens.
1130. Trisetum floribundum.
1131. Trisetum macbridei.
1133. Alopecurus bracteatus.
1134. Calamagrostis eminens.
1135. Poa nigriflora.
1150. Bromus lanatus.
1153. Dissanthelium calycinum.
1154. Briza mandoniana.

MACBRIDE, J. F., AND FEATHERSTONE, WILLIAM—Continued

1155. Dissanthelium peruvianum.
1156. Calamagrostis vicunarum.
1157. Aciachne pulvinata.
1204. Muhlenbergia angustata.
1205. Lamprothyrsus peruvianus.
1223. Melica scabra.
1253. Bromus unioloides.
1254. Aristida enodis.
1280a. Koeleria cristata.
1281. Agropyron attenuatum.
1282. Festuca compressifolia.
1283. Stipa mucronata.
1284. Calamagrostis macrophylla.
1366. Paspalum candidum.
1421. Sporobolus berteroanus.
1423. Andropogon hirtiflorus.
1425. Eragrostis montufari.
1427. Aegopogon cenchroides.
1433. Briza mandoniana.
1447. Trachypogon montufari.
1498. Axonopus elegantulus.
1499. Andropogon lateralis incanus.
1611. Andropogon lateralis incanus.
1687. Chusquea serrulata.
1695. Festuca compressifolia.
1696. Triniochloa stipoides.
1697. Calamagrostis humboldtiana.
1712. Poa annua.
1721. Muhlenbergia angustata.
1728. Briza mandoniana.
1729. Festuca megalura.
1780. Paspalum ceresia.
1800. Agrostis araucana.
1822. Cortaderia bifida.
1847. Agrostis gelida.
1875. Calamagrostis humboldtiana.
1876. Stipa mexicana.
1890. Cortaderia sericantha.
1929. Muhlenberiga angustata.
1970. Poa horridula.
2030. Paspalum pygmaeum.
2032. Festuca megalura.
2033. Stipa inconspicua.
2114. Muhlenbergia peruviana.
2118. Aegopogon cenchroides.
2172. Festuca dolichophylla.
2180. Agrostis gelida.
2183. Dissanthelium calycinum.
2212. Chusquea scandens.
2232. Melica scabra.
2307. Cortaderia rudiuscula.

MACBRIDE, J. F., AND FEATHERSTONE, WILLIAM—Continued

2443. Leptochloa uninervia.
2461. Festuca rigescens.
2500. Calamagrostis eminens.

MANDON, GILBERT

1243. Alopecurus aequalis.
1244. Alopecurus bracteatus.
1246. Phalaris angusta.
1252. Paspalum remotum.
1255. Paspalum ceresia.
1256. Ichnanthus minarum.
1257. Echinochloa crusgalli crus-pavonis.
1258. Echinochloa crusgalli crus-pavonis.
1259. Chaetochloa geniculata.
1260. Chaetochloa oblongata.
1261. Chaetochloa barbinodis.
1262. Chaetochloa argentina.
1263. Pennisetum latifolium.
1264. Pennisetum mutilatum.
1266. Cenchrus myosuroides.
1268. Nazia aliena.
1270. Nassella pubiflora.
1270. Oryzopsis florulenta.
1272. Stipa hans-meyeri.
1272. Anthochloa lepidula.
1273. Stipa ichu.
1274. Piptochaetium tuberculatum.
1276. Stipa mucronata.
1276. Stipa neesiana.
1277. Aristida enodis.
1277. Aristida adscensionis.
1279. Muhlenbergia angustata.
1280. Muhlenbergia rigida.
1281. Muhlenbergia peruviana.
1283. Muhlenbergia peruviana.
1284. Lycurus phleoides.
1285. Sporobolus berteroanus.
1286. Muhlenbergia ligularis.
1287. Aciachne pulvinata.
1291. Agrostis haenkeana.
1292. Agrostis haenkeana.
1292. Dissanthelium calycinum.
1292b. Calamagrostis rigescens.
1294. Polypogon elongatus.
1295. Polypogon lutosus.
1296. Aegopogon cenchroides.
1299. Calamagrostis leiophylla.
1301. Calamagrostis amoena.
1303. Calamagrostis amoena.

MANDON, GILBERT—Continued

1304. Calamagrostis montevidensis.
1306. Calamagrostis amoena.
1307. Calamagrostis violacea.
1308. Calamagrostis humboldtiana.
1309. Calamagrostis eminens.
1310. Calamagrostis eminens.
1312. Calamagrostis glacialis.
1313. Calamagrostis cryptolopha.
1314. Agrostis haenkeana.
1316. Calamagrostis curta.
1317. Calamagrostis rigescens.
1317. Calamagrostis vicunarum.
1318. Calamagrostis ovata.
1319. Calamagrostis chrysantha.
1320. Calamagrostis ovata.
1323. Chloris beyrichiana.
1325. Bouteloua simplex.
1327. Calamagrostis heterophylla.
1328. Eragrostis montufari.
1329. Eragrostis montufari.
1329. Eragrostis pilosa.
1330. Eragrostis montufari.
1331. Eragrostis lugens.
1332. Eragrostis lurida.
1336. Poa scaberula.
1338. Poa buchtienii.
1339. Poa horridula.
1341. Poa asperiflora.
1342. Poa myriantha.
1343. Melica scabra.
1345. Dissanthelium peruvianum.
1346. Dissanthelium minimum.
1347. Poa gymnantha.
1350. Poa gymnantha.
1351. Poa gymnantha.
1353. Poa humillima.
1354. Distichlis humilis.
1355. Briza mandoniana.
1356. Briza mandoniana.
1357. Melica adhaerens.
1359. Koeleria cristata.
1360. Lamprothyrsus hieronymi.
1361. Festuca dolichophylla.
1362. Festuca sublimis.
1363. Festuca megalura.
1365. Bromus pitensis.
1366. Bromus pitensis.
1367. Bromus unioloides.
1368. Bromus pitensis.
1369. Bromus unioloides.
1370. Bromus trinii.
1371. Trisetum floribundum.

MANDON, GILBERT—Continued

1375. Agropyron attenuatum.
1377. Lolium temulentum arvense.
1379. Hordeum murinum.
1380. Bouteloua curtipendula.
1382. Sorghastrum stipoides.
1383. Andropogon tener.
1384. Andropogon hirtiflorus.
1385. Andropogon hirtiflorus.
1387. Heteropogon contortus.
1388. Andropogon bicornis.
1389. Andropogon saccharoides parvispiculus.
1390. Holcus sorghum.

MATHEWS, ANDREW

425. Paspalum racemosum.
426. Paspalum racemosum.
429. Chaetochloa verticillata.
545. Polypogon elongatus.
770. Eragrostis weberbaueri.
935. Andropogon condensatus.
1079. Oplismenus hirtellus.
1080. Arundinella berteroniana.
2103. Pseudechinolaena polystachya.
2104. Panicum glutinosum.
2105. Chaetochloa tenacissima.
2111. Lasiacis sorghoidea.
3237. Briza mandoniana.
3239. Axonopus mathewsii.
3240. Agrostis tolucensis.
3241. Pseudechinolaena polystachya.
3242. Eragrostis nigricans.

MEYER, HANS

139. Stipa hans-meyeri.
144. Calamagrostis ligulata.
145. Agrostis haenkeana.
146. Agrostis haenkeana.
148. Calamagrostis mollis.
437. Poa cucullata.

MILLE, FATHER A.

8. Oplismenus rariflorus.
9. Eriochloa pacifica.
13. Panicum megiston.
17. Syntherisma aequatoriensis.
18. Syntherisma aequatoriensis.
19. Eragrostis mexicana.
20. Bouteloua pilosa.
22. Pennisetum occidentale.
23. Leptochloa filiformis.

MILLE, FATHER A.—Continued

25. Agropyron attenuatum.
50. Cynodon dactylon.
51. Bromus unioloides.
52. Eragrostis lurida.
53. Paspalum pilgerianum.
54. Eragrostis nigricans.
55. Bromus pitensis.
56. Cenchrus echinatus.
57. Stipa mucronata.
58. Paspalum penicillatum.
65. Polypogon lutosus.
200. Hordeum nodosum.
237. Bromus lanatus.
238. Bromus pitensis.
240. Bromus pitensis.
240½. Bromus pitensis.
242. Aegopogon cenchroides.
243. Muhlenbergia ligularis.
245. Triniochloa stipoides.
246. Bromus pitensis.
246. Muhlenbergia microsperma.
247. Aristida adscensionis.
248. Agrostis tolucensis.
249. Muhlenbergia peruviana.
250. Agrostis perennans.
251. Agrostis perennans.
253. Agrostis perennans.
254. Stipa ibarrensis.
255. Stipa ichu.
256. Stipa milleana.
257. Stipa mucronata.
258. Stipa inconspicua.
259. Stipa milleana.
260. Hordeum comosum.
261. Polypogon lutosus.
262. Polypogon lutosus.
263. Agropyron attenuatum.
264. Agropyron attenuatum.
267. Muhlenbergia angustata.
268. Trisetum spicatum.
269. Weingartneria canescens.
270. Aspris capillaris.
271. Eragrostis tenax.
272. Eragrostis pastoensis.
273. Eragrostis lurida.
274. Briza minor.
276. Briza mandoniana.
277. Poa cucullata.
279. Festuca megalura.
281. Festuca procera.
283. Festuca sublimis.
284. Festuca dolichophylla.

MILLE, FATHER A.—Continued

285. Festuca sublimis.
286. Festuca procera.
287. Festuca dichoclada.
288. Cortaderia sericantha.
289. Melica scabra.
291. Cynodon dactylon.
292. Eleusine indica.
293. Bouteloua simplex.
294. Brachypodium mexicanum.
296. Andropogon hirtiflorus.
297. Imperata contracta.
302. Axonopus scoparius.
303. Paspalum penicillatum.
303½. Paspalum penicillatum.
304. Paspalum conjugatum.
308. Chaetochloa cernua.
309. Panicum bulbosum.
310. Panicum maximum.
312. Oplismenus burmanni.
313. Oplismenus hirtellus.
314. Cenchrus myosuroides.
316. Pennisetum bambusiforme.
316. Pennisetum tristachyum.
317. Chaetochloa geniculata.
318. Neurolepis stuebelii.
319. Chusquea scandens.
320. Chusquea serrulata.
321. Arundinaria patula.
322. Cortaderia nitida.
323. Anthoxanthum odoratum.
371. Eragrostis patula.
392. Stipa milleana.

MULFORD BIOL. EXPED.[49]

298. Andropogon condensatus.

PACHANO, A.

15. Paspalum penicillatum.
64. Eragrostis nigricans.
93. Stipa ichu.
96. Bromus pitensis.
109. Chaetochloa cernua.
152. Paspalum pilgerianum.
228. Panicum sciurotis.
236. Axonopus scoparius.
239. Pennisetum peruvianum.
245. Chaetochloa poiretiana.

[49] See also Cárdenas, Rusby, and White.

PFLANZ, CARLOS

305. Calamagrostis ovata.
360. Poa asperiflora.
607. Panicum echinulatum.
2526. Chloris beyrichiana.
2541. Avena barbata.

PÖPPIG, E. F.

829. Axonopus capillaris.
957. Paspalum paniculatum.
966. Andropogon condensatus.
976. Olyra latifolia.
2280. Panicum zizanioides.

ROSE, J. N.

18518. Distichlis spicata.
18520. Cynodon dactylon.
18617. Chloris radiata.
18630. Panicum barbinode.
18644. Hordeum murinum.
18683. Poa candamoana.
18694. Stipa ichu.
18742. Paspalum racemosum.
18790. Polypogon lutosus.
18802. Aristida adscensionis.
18865. Poa annua.
18866. Polypogon lutosus.
18867. Poa annua.
18868. Bromus unioloides.
18925. Stipa inconspicua.
18980. Eragrostis peruviana.
18981. Eragrostis peruviana.
19009. Polypogon lutosus.
19535. Stipa nardoides.
22112. Pennisetum occidentale.
22141. Oplismenus burmanni.
22162. Paspalum racemosum.
22184. Lasiacis sorghoidea.
22208. Arundinella confinis.
22221. Hordeum vulgare.
22292. Chusquea peruviana.
22334. Eragrostis lurida.
22372. Pennisetum bambusiforme.
22381. Cortaderia rudiuscula.
22385. Arundo donax.
22402. Poa annua.
22404. Bromus unioloides.
22419. Aristida adscensionis.
22435. Gynerium sagittatum.
22436. Axonopus scoparius.
22446. Panicum pulchellum.
22472. Polypogon elongatus.
22473. Bromus pitensis.

ROSE, J. N.—Continued

22496. Polypogon lutosus.
22530. Pennisetum bambusiforme.
22539. Polypogon elongatus.
22540. Melica scabra.
22550. Muhlenbergia microsperma.
22582. Paspalum candidum.
22639. Paspalum humboldtianum.
22645. Paspalum saccharoides.
22647. Andropogon saccharoides parvispiculus.
22662. Agrostis trichodes.
22745. Poa annua.
22798. Eragrostis mexicana.
22799. Stipa ichu.
22886. Polypogon lutosus.
22887. Aegopogon cenchroides.
22890. Polypogon lutosus.
22915. Bromus unioloides.
22957. Paspalum candidum.
22958. Bromus unioloides.
22994. Calamagrostis recta.
22997. Cortaderia rudiuscula.
23075. Polypogon elongatus.
23076. Chaetochloa geniculata.
23102. Cortaderia bifida.
23149. Chusquea scandens.
23159. Chaetochloa geniculata.
23201. Chusquea scandens.
23202. Pennisetum bambusiforme.
23219. Paspalum candidum.
23237. Isachne arundinacea.
23318. Aegopogon cenchroides.
23374. Lasiacis sorghoidea.
23399. Eragrostis hypnoides.
23401. Lasiacis sorghoidea.
23402. Panicum sellowii.
23441. Leptochloa virgata.
23449. Panicum trichoides.
23469. Ichnanthus pallens.
23475. Panicum polygonatum.
23509. Pennisetum peruvianum.
23510. Gynerium sagittatum.
23513. Pennisetum setosum.
23525. Lasiacis oaxacensis.
23534. Agrostis tolucensis.
23535. Agrostis breviculmis.
23536. Stipa ibarrensis.
23573. Bromus unioloides.
23574. Stipa ibarrensis.
23575. Stipa ichu.
23577. Poa annua.
23909. Poa annua.

ROSE, J. N.—Continued

23938. Stipa inconspicua.
24016. Paspalum penicillatum.
24017. Paspalum racemosum.
24018. Muhlenbergia microsperma.
24019. Polypogon lutosus.
24020. Panicum polygonatum.
24021. Lolium temulentum.
24022. Paspalum racemosum.
24023. Polypogon lutosus.
24024. Aristida adscensionis.
24025. Paspalum racemosum.
24026. Polypogon lutosus.
24027. Paspalum humboldtianum.
24028. Agrostis breviculmis.
24029. Stipa mucronata.
24031. Agrostis tolucensis.
24032. Melica scabra.
24066. Stipa ibarrensis.

RUSBY, H. H.

6. Isachne arundinacea.
8. Hordeum murinum.
9. Calamagrostis heterophylla.
10. Chusquea serrulata.
13. Poa horridula.
14. Chloris beyrichiana.
16. Muhlenbergia tenuissima.
18. Zeugites mexicana.
22. Panicum laxum.
23. Paspalum lepidum.
24. Paspalum buchtienii.
27. Poa candamoana.
29. Paspalum buchtienii.
30. Paspalum remotum.
34. Bouteloua simplex.
39. Agrostis exasperata.
40. Agrostis verticillata.
41. Oplismenus hirtellus.
44. Festuca sublimis.
45. Eragrostis lugens.
49. Eragrostis lurida.
50. Festuca dolichophylla.
51. Muhlenbergia ligularis.
52. Melica adhaerens.
54. Hordeum murinum.
55. Sporobolus berteroanus.
179. Hordeum murinum.
189. Hyparrhenia bracteata.
190. Cenchrus viridis.
191. Lasiacis sorghoidea.
192. Eragrostis maypurensis.
194. Chloris polydactyla.

RUSBY, H. H.—Continued

195. Leersia hexandra.
196. Chusquea spicata.
198. Paspalum paniculatum.
200. Aegopogon cenchroides.
201. Muhlenbergia holwayorum.
201½. Calamagrostis heterophylla.
202. Sporobolus berteroanus.
204. Festuca sublimis.
205. Paspalum humboldtianum.
206. Muhlenbergia holwayorum.
207. Eleusine indica.
208. Aristida capillacea.
209. Olyra latifolia.
211. Paspalum decumbens.
212. Panicum pilosum.
214. Eriochloa distachya.
215. Eriochloa distachya.
215. Gymnopogon jubiflorus.
216. Axonopus chrysoblepharis.
217. Panicum pulchellum.
218. Pseudechinolaena polystachya.
221. Eleusine indica.
222. Chaetochloa geniculata.
223. Poa buchtienii.
224. Festuca dolichophylla.
225. Bromus unioloides.
226. Nassella pubiflora.
227. Eragrostis hypnoides.
228. Panicum laxum.
228. Panicum frondescens.
229. Panicum frondescens.
229. Pseudechinolaena polystachya.
230. Eragrostis hypnoides.
232. Pariana zingiberina.
234. Eragrostis lugens.
236. Panicum laxum.
237. Stipa neesiana.
238. Briza mandoniana.
239. Eragrostis lugens.
240. Paspalum penicillatum.
241. Axonopus capillaris.
243. Eragrostis hypnoides.
244. Panicum glutinosum.
245. Syntherisma sanguinalis.
246. Trichachne saccharifiora.
247. Stipa inconspicua.
328. Arundinella berteroniana.
674. Eriochloa punctata.
675. Syntherisma sanguinalis.
759. Panicum pilosum.
818. Eleusine indica.
1319. Chloris distichophylla.

RUSBY, H. H.—Continued

1321. Andropogon leucostachyus.
1433. Chaetochloa geniculata.
1635. Echinochloa crusgalli crus-pavonis.
1636. Panicum chloroticum.
1646. Leersia hexandra.
1657. Leptocoryphium lanatum.
1658½. Panicum laxum.
1669. Olyra ciliatifolia.
2142. Arundinella berteroniana.

SHEPARD, MRS. R. S.

57. Avena scabrivalvis.
58. Hordeum murinum.
59. Poa gymnantha.
60. Calamagrostis heterophylla.
61. Alopecurus bracteatus.
63. Stipa ichu.
90. Poa annua.
128. Distichlis humilis.
160. Polypogon lutosus.
167. Cortaderia rudiuscula.
259. Chaetochloa geniculata.

SODIRO, FATHER LUIS

13. Cenchrus myosuroides.
241. Cynodon dactylon.
244. Sporobolus berteroanus.
252. Agrostis araucana.
265. Calamagrostis humboldtiana.
266. Calamagrostis humboldtiana.
278. Festuca bromoides.
280. Festuca dasyantha.
282. Festuca procera.
290. Chloris radiata.
295. Andropogon bicornis.
298. Andropogon saccharoides parvispiculus.
299. Paspalum paniculatum.
299½. Paspalum macrophyllum.
300. Paspalum candidum.
301. Paspalum bonplandianum.
305. Panicum polygonatum.
306. Chaetochloa poiretiana.
307. Chaetochloa sulcata.
311. Lasiacis sorghoidea.
315. Pseudechinolaena polystachya.

SPRUCE, RICHARD

4180. Heteropogon melanocarpus.
4192. Panicum frondescens.

SPRUCE, RICHARD—Continued

4224. Imperata tenuis.
4368. Eriochloa distachya.
4402. Anthephora hermaphrodita.
4445. Bouteloua pilosa.
4500. Elyonurus adustus.
4501. Leptocoryphium lanatum.
4526. Aristida setifolia.
4807. Olyra heliconia.
4854. Andropogon saccharoides laguroides.
4855. Sporobolus berteroanus.
4856. Arundinella berteroniana.
4911. Chloris distichophylla.
5406. Stipa mucronata.
5407. Eragrostis pastoensis.
5408. Aegopogon cenchroides.
5509. Festuca dolichophylla.
5609. Eragrostis lugens.
5802. Nazia aliena.
5803. Polypogon lutosus.
5803. Polypogon elongatus.
5808. Eragrostis lurida.
5809. Chaetochloa geniculata.
5813. Eragrostis nigricans.
5814. Chaetochloa cernua.
5815. Bromus unioloides.
5816. Bromus unioloides.
5817. Stipa ibarrensis.
5818. Cenchrus echinatus.
5917. Brachypodium mexicanum.
5918. Aristida adscensionis.
5919. Distichlis spicata.
5921. Paspalum distichum.
5922. Bouteloua simplex.
5923. Stipa ichu.
5925. Agropyron attenuatum.
5926. Agrostis perennans.
5927. Agrostis tolucensis.
5927. Calamagrostis recta.
5929. Poa aequatoriensis.
5930. Agrostis tolucensis.
5933. Sporobolus berteroanus.
5934. Trisetum spicatum.
5935. Trisetum spicatum.
5936. Agrostis breviculmis.
5937. Pennisetum peruvianum.
5938. Festuca procera.
5940. Chusquea uniflora.
5941. Axonopus compressus.
5943. Paspalum penicillatum.
5957. Agrostis tolucensis.
5958. Stipa milleana.

SPRUCE, RICHARD—Continued

5958. Festuca megalura.
5959. Paspalum racemosum.
6092. Eragrostis mexicana.
6093. Chusquea peruviana.
6094. Heteropogon contortus.
6095. Poa aequatoriensis.
6096. Poa annua.
6097. Agrostis haenkeana.
6098. Poa pardoana.
6099. Andropogon cirratus.
6099. Andropogon hirtiflorus.
6100. Andropogon saccharoides parvispiculus.
6127. Coix lachryma.
6128. Isachne arundinacea.
6265. Leersia hexandra.
6326. Oplismenus burmanni.
6422. Panicum fasciculatum.
6424. Panicum geminatum.
6425. Echinochloa colonum.
6426. Pennisetum occidentale.
6427. Eragrostis cilianensis.
6428. Eragrostis pilosa.
6429. Eragrostis glomerata.
6430. Eragrostis hypnoides.
6431a. Eragrostis ciliaris.
6431b. Eragrostis ciliaris.
6432. Eragrostis viscosa.
6433. Eragrostis ciliaris.
6434. Phragmites communis.
6435. Aristida adscensionis.
6436. Chloris angustiflora.
6437. Chloris virgata.
6438. Chloris radiata.
6439. Chloris virgata.
6440. Anthephora hermaphrodita.
6441. Nazia aliena.
6442. Leptochloa filiformis.
6443. Bouteloua disticha.
6444. Cottea pappophoroides.
6446. Eriochloa pacifica.
6447. Eriochloa pacifica.
6449. Sporobolus virginicus.
6450. Sporobolus argutus.
6451. Cortaderia rudiuscula.

STEINBACH, JOSÉ

5120. Homolepis aturensis.
5130. Panicum frondescens.
5143. Andropogon selloanus.
5148. Sporobolus berteroanus.

STEINBACH, JOSÉ—Continued

5149. Eleusine indica.
5159. Axonopus compressus.
5160. Paspalum conjugatum.
5161. Panicum laxum.
5162. Paspalum polyphyllum.
5174. Eriochrysis cayennensis.
5175. Panicum caaguazuense.
5182. Eragrostis articulata.
5184. Eragrostis bahiensis.
5221. Trichachne sacchariflora.
5222. Leptochloa domingensis.
5231. Panicum polygonatum.
5244. Elyonurus adustus.
5259. Panicum echinulatum.
5273. Paspalum notatum.
5274. Andropogon bicornis.
5299. Panicum quadriglume.
5301. Hackelochloa granularis.
5320. Paspalum ekmanianum.
5338. Panicum laxum.
5339. Panicum procurrens.
5344. Andropogon virgatus.
5352. Aristida implexa.
5355. Aristida complanata.
5358. Trichopteryx flammida.
5359. Chloris distichophylla.
5377. Axonopus barbigerus.
5378. Panicum olyroides.
5379. Trachypogon montufari.
5385. Paspalum polyphyllum.
5386. Gymnopogon spicatus.
5404. Elyonurus adustus.
5421. Paspalum ceresia.
5426. Axonopus aureus.
5427. Andropogon lateralis.
5428. Sorghastrum parviflorum.
5430. Sorghastrum minarum.
5459. Paspalum melanospermum.
5551. Lasiacis sorghoidea.
5576. Cenchrus echinatus.
6610. Paspalum humboldtianum.
6638. Trichachne sacchariflora.
6639. Leptocoryphium lanatum.
6640. Leptocoryphium lanatum.
6641. Elyonurus adustus.
6642. Elyonurus adustus.
6643. Panicum versicolor.
6644. Paspalum humboldtianum.
6646. Panicum parvifolium.
6656. Panicum versicolor.
6676. Trichachne sacchariflora.
6701. Sporobolus indicus.

STEINBACH, JOSÉ—Continued

6707. Sporobolus indicus.
6723. Andropogon selloanus.
6724. Axonopus fissifolius.
6807. Aristida enodis.
6808. Paspalum polyphyllum.
6809. Andropogon condensatus.
6818. Paspalum humboldtianum .
6834. Leptochloa virgata.
6835. Paspalum distichum.
6836. Paspalum conjugatum.
6837. Eleusine indica.
6838. Cenchrus echinatus.
6839. Syntherisma sanguinalis.
6840. Panicum polygonatum.
6842. Chaetochloa vulpiseta.
6843. Sporobolus indicus.
6844. Sporobolus indicus.
6845. Andropogon leucostachyus.
6846. Andropogon leucostachyus.
6847. Axonopus fissifolius.
6850. Panicum laxum.
6851. Andropogon lateralis.
6852. Sporobolus indicus.
6854. Sporobolus indicus.
6855. Panicum frondescens.
6857. Panicum boliviense.
6865. Panicum parviflorum.
6867. Chloris distichophylla.
6868. Leptochloa domingensis.
6873. Paspalum plicatulum.
6874. Andropogon selloanus.
6875. Elyonurus adustus.
6877. Syntherisma cuyabensis.
6879. Axonopus capillaris.
6881. Eragrostis bahiensis.
6885. Imperata tenuis.
6889. Eragrostis bahiensis.
6894. Imperata minutiflora.
6896. Elyonurus tripsacoides.
6898. Paspalum densum.
6899. Eragrostis expansa.
6900. Panicum tricholaenoides.
6915. Eriochrysis cayennensis.
6923. Paspalum ekmanianum.
6928. Imperata tenuis.
6935. Panicum cayennense.
6945. Andropogon virgatus.
6947. Trachypogon canescens.
6948. Axonopus aureus.
6949. Andropogon bicornis.

STEINBACH, JOSÉ—Continued

6950. Andropogon condensatus.
6951. Andropogon condensatus.
6952. Andropogon condensatus.
6953. Andropogon condensatus.
6958. Trichopteryx flammida.
6871. Andropogon selloanus.
6873. Manisuris aurita.
6976. Axonopus barbigerus.
6977. Gymnopogon spicatus.
6978. Panicum olyroides.
6979. Panicum ghiesbreghtii.
6980. Eragrostis polytricha.
6984. Sorghastrum parviflorum.
6989. Syntherisma digitata.
6990. Axonopus compressus.
6991. Eragrostis articulata.
7001. Panicum parvifolium.
7010. Oplismenus hirtellus.
7012. Panicum procurrens.
7013. Homolepis aturensis.
7020. Paspalum notatum.
7028. Sorghastrum minarum.
7029. Aristida implexa.
7030. Sacciolepis myuros.
7032. Eriochrysis warmingianum.
7036. Paspalum plicatulum.
7050. Sorghastrum parviflorum.
7057. Syntherisma sanguinalis.
7103. Paspalum stellatum.
7111. Lasiacis sorghoidea.
7116. Leersia hexandra.

STÜBEL

34. Calamagrostis macrophylla.
60. Festuca rigescens.
60e. Bromus unioloides.
60f. Poa scaberula.
61b. Bromus lanatus.
87. Festuca orthophylla.
102. Paspalum pilgerianum.
152. Aira conferta.
153. Aristida spadicea.
207. Festuca breviaristata.
230. Poa cucullata.
231. Agrostis nigritella.
231b. Calamagrostis jamesoni.
247. Chaetochloa cernua.
257. Calamagrostis humboldtiana.
292. Cortaderia sericantha.
297. Festuca sublimis.

TATE, G. H. H.

19. Pseudechinolaena polystachya.
28. Ichnanthus pallens.
530. Paspalum pallidum.
546. Notholcus lanatus.
569. Oplismenus burmanni.
599. Notholcus lanatus.
600. Aegopogon cenchroides.
601. Andropogon condensatus.

ULE, ERNST

6513. Arundinella berteroniana.
6598. Arundinaria humillima.
9144. Pharus glaber.
9146. Olyra ecaudata.

WEBERBAUER, A.

137. Paspalum sodiroanum.
415. Paspalum pygmaeum.
415. Muhlenbergia peruviana.
472. Poa candamoana.
474. Calamagrostis heterophylla.
475. Stipa rigidiseta.
477. Poa fibrifera.
545. Ichnanthus minarum.
688. Chusquea dombeyana.
694. Chusquea peruviana.
905. Calamagrostis heterophylla.
906. Calamagrostis antoniana.
907. Festuca dolichophylla.
940. Stipa hans-meyeri.
960. Calamagrostis rigida.
1003. Calamagrostis cephalantha.
1014. Calamagrostis rigida.
1025. Stipa hans-meyeri.
1028. Trisetum floribundum.
1041. Calamagrostis rigida.
1131. Ichnanthus peruvianus.
1328. Cortaderia bifida.
1487. Stipa nardoides.
1490. Cenchrus humilis.
1553. Paspalum flavum.
2129. Chusquea tarmensis.
2217. Chusquea spicata.
2231. Calamagrostis podophora.
2233. Festuca dolichophylla.
2295. Chusquea inamoena.
2381. Sporobolus lasiophyllus.
2393. Pennisetum weberbaueri.
2460. Calamagrostis tarmensis.
2462. Festuca compressifolia.

WEBERBAUER, A.—Continued

2467. Sporobolus lasiophyllus.
2586. Festuca dolichophylla.
2602. Poa humillima.
2615. Stipa depauperata.
2662. Poa fibrifera.
2663. Eragrostis pastoensis.
2686. Calamagrostis rigescens.
2811. Trisetum floribundum.
2814. Festuca casapaltensis.
2842. Calamagrostis heterophylla.
2999. Eragrostis carazensis.
3073. Poa carazensis.
3076. Stipa depauperata.
3078. Trisetum floribundum.
3105. Calamagrostis heterophylla.
3106. Festuca dolichophylla.
3113. Poa horridula.
3114. Eragrostis pilgeriana.
3142. Paspalum lineispatha.
3189. Eragrostis weberbaueri.
3218. Festuca dolichophylla.
3230. Festuca dichoclada.
3275. Festuca glyceriantha.
3317. Festuca dolichophylla.
3349. Cortaderia bifida.
3387. Arundinaria haenkei.
3709. Chusquea depauperata.
3719. Agrostis perennans.
3815. Paspalum tuberosum.
3932. Paspalum tuberosum.
3974. Festuca dolichophylla.
3975. Poa pardoana.
4021. Chusquea polyclados.
4135. Eriochloa weberbaueri.
4408. Chusquea straminea.
4415. Chusquea weberbaueri.
4562. Guadua weberbaueri.
4590. Paspalum gossipinum.
4842. Festuca orthophylla.
4873. Calamagrostis trichophylla.
5113. Poa humillima.
5118. Poa chamaeclinos.
5283. Panicum ramosum.
5311. Tripogon spicatus.
5353. Stipa annua.
5354. Pennisetum annuum.
5380. Aristida adscensionis.
5440. Poa gymnantha.
5451. Dissanthelium minimum.
5581. Chusquea huantensis.
5938. Aristida adscensionis.

WEBERBAUER, A.—Continued

5950. Anthephora hermaphrodita.
5952. Eriochloa peruviana.
5961. Bouteloua disticha.
5963. Aristida adscensionis.
5964. Chloris virgata.
6186. Sporobolus mirabilis.
6570. Axonopus elegantulus.
6836. Eragrostis weberbaueri.
6867. Aristida adscensionis.
6868. Bouteloua simplex.
6869. Pappophorum wrightii.
6870. Eragrostis weberbaueri.
6892. Festuca orthophylla.
6893. Stipa ichu.
6897. Festuca orthophylla.
6898. Calamagrostis violacea.
6900. Calamagrostis violacea.
6901. Calamagrostis heterophylla.
6902. Bromus lanatus.
6903. Stipa depauperata.
6904. Calamagrostis violacea.
6905. Poa gymnantha.
6906. Stipa depauperata.
6915. Calamagrostis heterophylla.
6922. Festuca sublimis.
6923. Agrostis araucana.
6924. Cortaderia nitida.
6966. Stipa hans-meyeri.
7030. Neurolepis weberbaueri.
7031. Arundinaria hirtula.
7295. Muhlenbergia peruviana.
7310. Poa candamoana.
7317. Calamagrostis violacea.
7339. Nassella pubiflora.
7346. Festuca dolichophylla.
7405. Eragrostis nigricans.
7410. Aristida adscensionis.
7413. Bouteloua simplex.
7438. Eragrostis cilianensis.
7439. Pappophorum wrightii.
7442. Stipa annua.
7447. Eragrostis limbata.
7447a. Eragrostis nigricans.

WHITE, O. E. (MULFORD BIOL. EXPL.)

173. Calamagrostis vicunarum.
190. Cortaderia bifida.
238. Calamagrostis humboldtiana.
297. Gynerium sagittatum.
604. Cenchrus myosuroides.
613. Eragrostis glomerata.
627. Manisuris fasciculata.
901. Gynerium sagittatum.
914. Eriochloa punctata.
915. Eragrostis glomerata.
915. Eragrostis ciliaris.
961. Panicum polygonatum.
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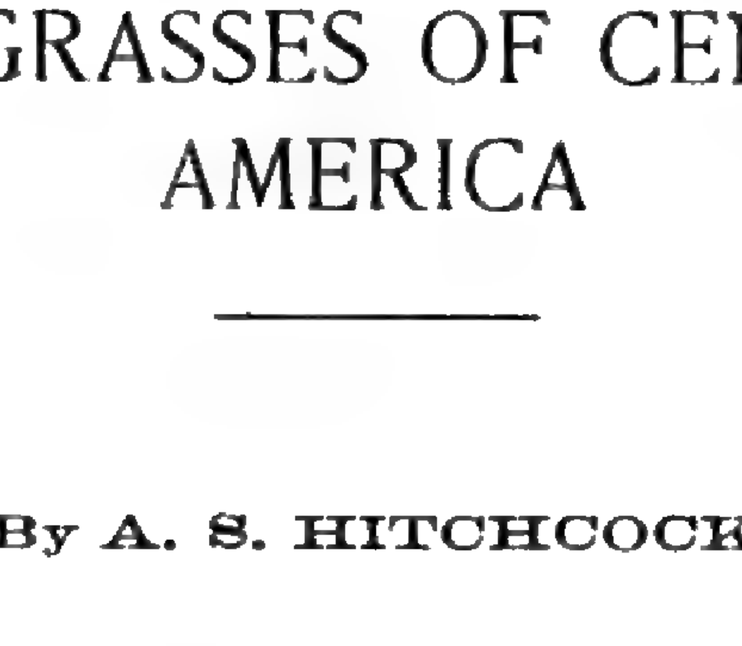
THE GRASSES OF CENTRAL AMERICA

By A. S. HITCHCOCK



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PREFACE

The accompanying paper by Prof. A. S. Hitchcock, botanist in charge of systematic agrostology, United States Department of Agriculture, is an account of the grasses of Central America and is a continuation of his series of papers on the grass floras of tropical American countries. As here understood, Central America embraces the area between Colombia and Mexico. This territory, which includes Panama, lies entirely within the Tropics and, except for the summits of the high mountain peaks, the flora is tropical. The flora of the lowland along the Atlantic coast is similar to that of the other American tropical lowlands bordering the Atlantic Ocean. Although the climate of the elevated regions of the interior is temperate, the grasses found there are, with few exceptions, those confined to Mexico, Central America, and Colombia. The higher peaks reach an altitude of 3,500 meters, but are not high enough to support an alpine flora. The present paper includes 115 genera and 460 species.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

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THE GRASSES OF CENTRAL AMERICA

By A. S. Hitchcock

INTRODUCTION

Until the present century very few collections of plants were made in Central America and until recently little has been written on the grasses of that region. Panama was visited by some of the earlier expeditions sent out to study the flora of divers parts of the world. Among these was the voyage of the Herald. Seamann's account of the botany of this voyage included a flora of the Isthmus of Panama. The Biologia Centrali-Americana by Godman and Salvin included an account of the botany by Hemsley. In this work there are no detailed descriptions, and the grasses listed are mainly from Mexico.

The collections of Heyde and Lux, of Thieme, and of John Donnell Smith in Guatemala, and of Pittier and his colleagues in Costa Rica, yielded many grasses. Hackel described many new species from these collections, and a smaller number were described by Vasey and by Scribner. Various parts of Central America have been visited during the present century by American botanists. Of special importance, aside from the collections mentioned above, are those made by Paul C. Standley, who visited Panama, Costa Rica, El Salvador, and Honduras. Mr. Standley has published a part of the results of his explorations in Central America in his account of the Flora of the Panama Canal Zone.[1] The writer visited Panama, Costa Rica, Nicaragua, El Salvador, Honduras, and Guatemala, in 1911, collecting only grasses. The collections now in the United States National Herbarium are large and may be said to be fairly representative of Central America, although there is comparatively little material from British Honduras. However, there are large areas, especially in Honduras and Nicaragua, into which no botanist has penetrated. The amount of material at hand is thought, nevertheless, to be sufficient to warrant the publication of a paper on the grasses.

[1] Contr. U. S. Nat. Herb. 27 : 1–416. pls. 1–67. figs. 1–7. 1928.

Central America as here understood includes Panama and the Canal Zone, Costa Rica, Nicaragua, El Salvador, Honduras, Guatemala, and British Honduras.

Central America consists of a central elevated region with lowlands along the two coasts. The mountainous part includes a few high peaks reaching an elevation of 3,500 meters or more. The chief peaks from which we have collections of plants are the volcanoes Agua in Guatemala, Irazú and Poás in Costa Rica, and Chiriquí in Panama. The flora of the summits of these peaks is high-temperate but scarcely alpine. So far as concerns the grasses the flora of the elevated interior is in the main an extension of that of the Mexican plateau. The coastal region on the Pacific side is much drier than that on the Atlantic side. It possesses a well-marked dry season, as a result of which there are extensive "savannas," grassy treeless plains and hills, extending from Panama to Mexico. The Atlantic coastal region receives an abundance of rain and for the most part supports a tropical rain forest.

The synonymy given is intended to include species described from Central America and names in general use. It is intended also to include names used for species in Hemsley (Biologia Centrali-Americana, mentioned above); in Nash (North American Flora); and in recent revisions of genera, in so far as reference is made to Central America.

The names of the genera are in accord with the list of Nomina Conservanda appended to the International Rules of Nomenclature.

DESCRIPTIVE LIST WITH KEYS

POACEAE

Flowers perfect (rarely unisexual), small, with no distinct perianth, arranged in spikelets consisting of a shortened axis (rachilla) and 2 to many 2-ranked bracts, the lowest two being empty (the glumes, rarely one or both of these obsolete), the one or more succeeding ones (lemmas) bearing in their axils a single flower, and, between the flower and the rachilla, a second 2-nerved bract (the palea), the lemma, palea, and flower together constituting the floret; stamens 1 to 6, usually 3, with very delicate filaments and 2-celled anthers; pistil 1, with a 1-celled 1-ovuled ovary, 2 (rarely 1 or 3) styles, and usually plumose stigmas; fruit a caryopsis with starchy endosperm and a small embryo at the base on the side opposite the hilum.

Herbs, or rarely woody plants, with usually hollow stems (culms) closed at the nodes, and 2-ranked parallel-veined leaves, these consisting of 2 parts, the sheath, enveloping the culm, its margins overlapping or sometimes grown together, and the blade, usually flat; at the junction of the two on the inside, a membranaceous hyaline or hairy appendage (the ligule).

The spikelets are almost always aggregate in spikes or panicles at the ends of the main culms or branches. The perianth is usually represented by 2 (rarely 3) small hyaline scales (the lodicules) at the base of the flower inside

the lemma and palea. The grain or caryopsis (the single seed and the adherent pericarp) may be free, as in wheat, or permanently inclosed in the lemma and palea, as in the oat. Rarely the seed is free from the pericarp, as in species of *Sporobolus* and *Eleusine*. The culms of bamboos are woody, as are also those of a few genera, such as *Olyra* and *Lasiacis*, belonging to other tribes. The culms are solid in our species of the tribes Tripsaceae and Andropogoneae, in some species of *Aristida*, *Sporobolus*, and *Muhlenbergia*, and in a few other genera.

The parts of the spikelet may be modified in various ways. The first glume, and more rarely also the second, may be wanting. The lemmas may contain no flower, or even no palea, or may be reduced or rudimentary.

Most of the genera of grasses fall naturally into one of the two series or subfamilies. The remaining few are rather arbitrarily assigned to one or the other series. In the same manner, most of the genera may be assembled into distinct and well-marked tribes. Several, however, are not closely allied to the other genera in the tribe to which they are assigned, but are so placed for convenience in classification.

KEY TO THE TRIBES

Series I. POATAE

Spikelets 1 to many-flowered, the reduced florets, if any, above the perfect florets (except in Phalarideae; 1 or more sterile lemmas below in Bambuseae and in *Uniola*); articulation usually above the glumes.

Plants woody, low or tall shrubs, often clambering, rarely tall trees. Spikelets 1 to many-flowered, 1 to several sterile lemmas below the perfect one. **BAMBUSEAE** (p. 560).

Plants herbaceous (somewhat woody in *Arundo*).

Stigmas 3. Stamens 6; spikelets 1-flowered.

Lemma with a long, much-contorted awn—**6. STREPTOCHAETA** (p. 572).

Lemma awnless—**63. PHARUS** (p. 616).

Stigmas 2.

Spikelets with 2 staminate, neuter, or rudimentary lemmas unlike and below the fertile lemma; no sterile or rudimentary florets above **PHALARIDEAE** (p. 563).

Spikelets without sterile lemmas below the perfect floret or these rarely present and like the fertile ones.

Spikelets unisexual, 1-flowered. Plants monoecious.

Stamens numerous; spikelets in groups of 6 in a spike. **26. PARIANA** (p. 586).

Stamens 6; spikelets single in a panicle—**ZIZANIEAE** (p. 564).

Spikelets perfect (rarely unisexual, but then not as above), usually articulate above the glumes.

Spikelets articulate below the glumes, 1-flowered, very flat, the lemma and palea about equal, both keeled; glumes small or wanting. **ORYZEAE** (p. 563).

Spikelets articulate above the glumes (rarely below, but the glumes, at least one, well developed).

Spikelets 1-flowered in groups (short spikes) of 2 to 5, the groups racemose along a main axis, falling entire; lemma and palea thinner than the glumes—**TRAGEAE** (p. 562).

Spikelets not as above.
Spikelets sessile on a usually continuous rachis (short-pedicellate in *Leptochloa*).
Spikelets on opposite sides of the rachis; spike terminal, single.
HORDEAE (p. 562).
Spikelets on one side of the rachis; spikes usually more than 1, digitate or racemose_____**CHLORIDEAE** (p. 563).
Spikelets pedicellate in open or contracted, sometimes spikelike, panicles.
Spikelets 1-flowered_____**AGROSTIDEAE** (p. 562).
Spikelets 2 to many-flowered.
Glumes as long as the lowest floret, usually as long as the spikelet; lemmas awned from the back.
AVENEAE (p. 562).
Glumes shorter than the lowest floret; lemmas awnless or awned from the tip or from a bifid apex. (See also *Trisetum pringlei*)_____**FESTUCEAE** (p. 561).

Series 2. PANICATAE

Spikelets with 1 perfect terminal floret (disregarding the few monoecious genera and the staminate and neuter spikelets) and a sterile or staminate floret below, usually represented by a sterile lemma only, 1 glume sometimes (rarely both glumes) wanting; articulation below the spikelets (except in Melinideae) either in the pedicel, in the rachis, or at the base of a cluster of spikelets, the spikelets falling entire, either singly, in groups, or together with joints of the rachis; spikelets, or at least the fruits, more or less dorsally compressed. (*Isachne* has 2 perfect florets.)

Glumes membranaceous; fertile lemma and palea indurate or at least as firm as the glumes; sterile lemma like the glumes in texture.
Fertile lemma and palea scarcely firmer than the glumes; lower floret staminate or neuter, awnless, the perfect floret awned (except in *Melinis*).
MELINIDEAE (p. 564).
Fertile lemma and palea indurate or subindurate, usually much firmer than the glumes; perfect floret usually awnless_____**PANICEAE** (p. 564).

Glumes indurate; fertile lemma and palea hyaline or membranaceous, the sterile lemma like the fertile one in texture.
Inflorescence not monoecious, the fertile spikelets perfect, each usually paired with a sterile spikelet_____**ANDROPOGONEAE** (p. 566).
Inflorescence monoecious, the pistillate spikelets below, the staminate above on the same rachis_____**TRIPSACEAE** (p. 567).

KEY TO THE GENERA

1. BAMBUSEAE

Stamens 6. Spikelets several-flowered.
Keels of palea winged_____**2. GUADUA** (p. 568).
Keels of palea projecting but not winged_____**1. BAMBUSA** (p. 567).
Stamens 3.
Spikelets with 1 perfect floret and 2 sterile lemmas below.
5. CHUSQUEA (p. 569).

Spikelets with more than 1 perfect floret.
Sterile lemmas none; plants shrubby or arborescent.
3. ARUNDINARIA (p. 568).
Sterile lemmas 1 or 2; plants high climbing.
4. ARTHROSTYLIDIUM (p. 569).

2. FESTUCEAE

Lemmas or rachilla with long silky hairs as long as the lemmas (staminate spikelets glabrous in *Gynerium*); tall stout reeds (*Cortaderia* a lower bunch grass).
Blades crowded at the base of the culms——**16. CORTADERIA** (p. 581).
Blades distributed along the culms.
Spikelets unisexual; plants dioecious; culms very tall, short-jointed.
17. GYNERIUM (p. 582).
Spikelets perfect; plants moderately tall.
Lemmas hairy; rachilla naked——**14. ARUNDO** (p. 581).
Lemmas naked; rachilla hairy——**15. PHRAGMITES** (p. 581).
Lemmas and rachilla sometimes pubescent but not bearing long silky hairs.
Blades broad, ovate or elliptic, showing transverse veins between the nerves.
Spikelets 3 to 5 flowered, only the lowest floret perfect; glumes broad, truncate; panicles small——**22. ZEUGITES** (p. 584).
Spikelets 1 or 2 flowered, the second floret commonly obsolete, only the elongate rachilla present; glumes acuminate; panicle large, diffuse.
21. ORTHOCLADA (p. 583).
Blades linear, no prominent transverse veins.
Spikelets of 2 forms, sterile and fertile intermixed; panicle dense, golden-yellow, somewhat 1-sided——**19. LAMARCKIA** (p. 582).
Spikelets all alike in the same inflorescence.
Spikelets in 1-sided dense clusters, these at the ends of a few stiff panicle branches——**18. DACTYLIS** (p. 582).
Spikelets not in 1-sided clusters.
Stigmas elongate, wiry, coiled, tendril-like. Spikelets in a long, 1-sided raceme——**20. STREPTOGYNE** (p. 583).
Stigmas not elongate nor wiry.
Lemmas 3-nerved, the palea usually persistent.
12. ERAGROSTIS (p. 576).
Lemmas 5 to many nerved, the nerves sometimes obscure.
Spikelets with 1 to 4 empty lemmas below the fertile florets, large and very flat——**13. UNIOLA** (p. 580).
Spikelets with no empty lemmas below the fertile ones.
Lemmas as broad as long, the margins outspread; florets closely imbricate, horizontally spreading——**11. BRIZA** (p. 576).
Lemmas longer than broad, the margins clasping the palea; florets not horizontally spreading.
Lemmas awnless, acutish, keeled——**10. POA** (p. 575).
Lemmas awned or, if awnless, rounded on the back.
Spikelets terete, short-pediceled along the main axis forming a simple raceme——**8. BRACHYPODIUM** (p. 573).
Spikelets laterally compressed in an open or condensed panicle.
Awn from between 2 short teeth; lemmas strongly keeled——**7. BROMUS** (p. 573).
Awn terminal or wanting; lemmas rounded on the back——**9. FESTUCA** (p. 573).

3. HORDEAE

Spikelets unisexual, the plants dioecious, the staminate spikelets many-flowered
in a spike, the pistillate single or in clusters_____25. JOUVEA (p. 585).
Spikelets perfect.
Spikelets placed edgewise to the rachis_____24. LOLIUM (p. 585).
Spikelets placed flatwise to the rachis_____23. TRITICUM (p. 584).

4. AVENEAE

Spikelets 2-flowered, the lower floret perfect, awnless, the upper floret staminate,
bearing a hooklike dorsal awn_____29. HOLCUS (p. 588).
Spikelets 2 to 5 flowered, the florets all fertile.
Plants perennial; glumes less than 1 cm. long_____27. TRISETUM (p. 586).
Plants annual; glumes more than 1 cm. long_____28. AVENA (p. 588).

5. AGROSTIDEAE

Rachilla articulate below the glumes, the spikelet deciduous.
Glumes awned_____33. POLYPOGON (p. 592).
Glumes awnless_____32. CINNA (p. 591).
Rachilla articulate above the glumes.
Fruit indurate, terete, nerveless, the callus sharp-pointed.
Awn trifid (the lateral awns short or obsolete in 3 species).
40. ARISTIDA (p. 599).
Awn simple_____39. STIPA (p. 599).
Fruit thin or firm but scarcely indurate, if firm the nerves evident; callus
not well developed.
Perfect spikelet surrounded by several sterile spikelets in the form of
bristles or delicate bracts_____34. PEREILEMA (p. 592).
Perfect spikelet not accompanied by sterile spikelets.
Rachilla prolonged behind the palea___30. CALAMAGROSTIS (p. 588).
Rachilla not prolonged.
Lemma shorter than the glumes, thin and delicate.
31. AGROSTIS (p. 590).
Lemma as long as or longer than the glumes, not more delicate than
these.
Lemma awned, the awn dorsal, geniculate.
36. TRINIOCHLOA (p. 595).
Lemma awnless, or, if awned, the awn not dorsal and geniculate.
Lemma awnless, obtuse or acutish; 1 glume, sometimes both
glumes, shorter than the lemma__38. SPOROBOLUS (p. 596).
Lemma awned from the tip or awnless, if awnless the lemma
acuminate, usually longer than the glumes.
35. MUHLENBERGIA (p. 593).
Lemma awned from below the tip, or awnless; glumes equal and
about as long as the lemma_____37. EPICAMPES (p. 595).

6. TRAGEAE

Spikelets with 3 long awns much exceeding the body of the spikelet.
44. FOURNIERA (p. 604).
Spikelets awnless or short-awned, in clusters of 2 to 5.
Spikelets 3 or 4 together, each group surrounded by an indurate pitcher-
shaped false involucre formed by the first glume of each spikelet.
41. ANTHEPHORA (p. 603).

Spikelets not surrounded by an involucre.
Clusters erect, the spike not 1-sided_____42. **HILARIA** (p. 603).
Clusters nodding along one side of a delicate axis.
43. **AEGOPOGON** (p. 603).

7. CHLORIDEAE

Spikes more or less digitate.
Spikelets 1-flowered the rachilla prolonged as an inconspicuous bristle.
49. **CYNODON** (p. 607).
Spikelets with 1 perfect floret and 1 or more rudimentary florets.
54. **CHLORIS** (p. 609).
Spikelets 3 to several-flowered.
Rachis prolonged beyond the spikelets.
48. **DACTYLOCTENIUM** (p. 606).
Rachis not prolonged_____47. **ELEUSINE** (p. 606).
Spikes solitary or racemosely arranged.
Spikes solitary.
Spikelets 1-flowered, awnless_____52. **MICROCHLOA** (p. 608).
Spikelets with 1 perfect floret and 1 or more sterile florets, long-awned.
51. **CTENIUM** (p. 608).
Spikes several.
Spikelets 1-flowered, the rachilla not prolonged__50. **SPARTINA** (p. 607).
Spikelets more than 1-flowered or the rachilla prolonged.
Fertile florets at least 2.
Lemmas awnless or short-awned; upper floret reduced to a small awnless lemma_____45. **LEPTOCHLOA** (p. 604).
Lemmas with awns as long as the body; upper floret reduced but awned_____46. **GOUINIA** (p. 605).
Fertile floret 1, with a rudiment above.
Spikes long and slender_____53. **GYMNOPOGON** (p. 608).
Spikes short and thick, or the spikelets closely arranged.
Spikes oblong or linear; spikelets several to many in each spike.
55. **BOUTELOUA** (p. 611).
Spikes triangular, rather distant along the main axis; spikelets 2 or 3 to each spike.
Spikelets 2, one of them reduced to a cluster of awns; sterile floret 1_____57. **PENTARRHAPHIS** (p. 614).
Spikelets 3, the lateral staminate or rudimentary, smaller than the terminal; sterile florets 2 or more.
56. **CATHESTECUM** (p. 613).

8. PHALARIDEAE

Lower florets staminate; spikelets brown and shining.
58. **HIEROCHLOË** (p. 614.)
Lower florets neuter; spikelets green or yellowish.
59. **ANTHOXANTHUM** (p. 614).

9. ORYZEAE

Glumes minute; lemma often awned_____60. **ORYZA** (p. 615).
Glumes wanting; lemma awnless_____61. **LEERSIA** (p. 615).

10. ZIZANIEAE

A single genus in our area----------62. **LUZIOLA** (p. 616).

11. MELINIDEAE

Sterile lemma awned----------64. **MELINIS** (p. 617).
Sterile lemma awnless, the fertile lemma awned.
65. **ARUNDINELLA** (p. 618).

12. PANICEAE

Spikelets unisexual; the plants monoecious.
Panicles large (small in *O. lateralis*), terminal on the culms or leafy branches, the pistillate spikelets above, the staminate below in the same panicle.
92. **OLYRA** (p. 683).
Panicles all axillary or axillary and terminal, the terminal when present wholly staminate.
Fruit laterally compressed, conspicuously gibbous on the upper dorsum.
93. **LITHACHNE** (p. 684).
Fruit dorsally compressed, lanceolate----------94. **RADDIA** (p. 684).
Spikelets perfect.
Axis thickened and corky, the spikelets sunken in cavities in its joints, these disarticulating at maturity----------69. **STENOTAPHRUM** (p. 622).
Axis not thickened, the spikelets not sunken in it.
Spikelets subtended or surrounded by 1 or more bristles or spines (sterile branchlets), these distinct or more or less connate at base, forming a false involucre.
Bristles persistent; spikelets deciduous.
Sterile palea at maturity becoming cartilaginous and winged, much exceeding the spikelet in width; spikelets secund along the branches of a simple panicle, each subtended by a single viscid bristle.
89. **IXOPHORUS** (p. 678).
Sterile palea not enlarged at maturity; subtending bristles 1 to many.
88. **SETARIA** (p. 673).
Bristles falling with the spikelets at maturity.
Bristles not united at base, usually slender, sometimes plumose.
90. **PENNISETUM** (p. 678).
Bristles more or less united at the base forming a bur.
91. **CENCHRUS** (p. 681).
Spikelets not subtended or surrounded by bristles.
Glumes or sterile lemma awned (awn reduced to a point in *Echinochloa colonum*, hidden in the hairs of the spikelet in *Tricholaena*).
Inflorescence of 1-sided racemes along a common axis.
Blades lanceolate, broad and thin; glumes 2-lobed, awned from between the lobes----------84. **OPLISMENUS** (p. 669).
Blades long and narrow; glumes awned from the tip.
85. **ECHINOCHLOA** (p. 670).
Inflorescence paniculate.
Spikelets long-silky. First glume minute.
87. **TRICHOLAENA** (p. 672).
Spikelets not silky, with a long-pointed callus at base.
86. **CHAETIUM** (p. 672).

Glumes and lemmas awnless.
Lower floret of the spikelet perfect, usually fruitful. Spikelets small, turgid, obtuse_____83. **ISACHNE** (p. 668).
Lower floret staminate or neuter.
Spikelets in open or condensed panicles.
Spikelets globose, oblique on the pedicels. Culms usually woody. **79. LASIACIS** (p. 662).
Spikelets usually not globose, not oblique on the pedicels.
Fertile lemma with wings or broad scars at base; glumes often somewhat caudate_____78. **ICHNANTHUS** (p. 661).
Fertile lemma not winged nor broadly scarred at base.
First glume wanting____66. **LEPTOCORYPHIUM** (p. 619).
First glume present.
Fruit indurate, its margins inrolled. First glume usually shorter than the spikelet___77. **PANICUM** (p. 646).
Fruit cartilaginous or membranaceous, the margin not inrolled.
First glume as long as the spikelet. **82. HOMOLEPIS** (p. 668).
First glume shorter than the spikelet. Panicles elongate.
Second glume inflated-saccate; blades narrow, linear, not cordate-clasping_80. **SACCIOLEPIS** (p. 667).
Second glume not inflated-saccate; blades broad, cordate-clasping_____81. **HYMENACHNE** (p. 667).
Spikelets in 1-sided racemes, the racemes digitate or racemose.
Rachilla joint and adnate rudimentary first glume forming a swollen ringlike callus at the base of the spikelet. **73. ERIOCHLOA** (p. 625).
Rachilla joint not forming a ringlike callus.
Blades ovate-lanceolate; racemes loose; mature spikelets burlike with hooked hairs. **71. PSEUDECHINOLAENA** (p. 624).
Blades linear to lanceolate.
First glume wanting (present in a few species of *Paspalum*).
Spikelets in 2 to 4 rows in close 1-sided racemes.
Spikelets placed with the back of the fertile lemma (hence the second glume) turned away from the rachis. **75. AXONOPUS** (p. 626).
Spikelets (or the primary one of a pair) placed with the back of the fertile lemma (hence the second glume) turned toward the rachis__76. **PASPALUM** (p. 629).
First glume present (obscure or wanting in *Thrasya* and species of *Digitaria*).
Spikelets placed with the first glume toward the rachis.
Spikelets in close 1-sided racemes.
Racemes several_____74. **BRACHIARIA** (p. 626).
Racemes solitary, spikelike.
Racemes erect, the rachis slender; spikelets swollen on the side toward the rachis and fitting into alternate hollows____72. **MESOSETUM** (p. 624).
Racemes curved, the rachis broad-winged; spikelets not fitting into hollows__70. **THRASYA** (p. 623).

Spikelets placed with the first glume away from the rachis.
Racemes loose, in a flabellate panicle; spikelets conspicuously silky_____67. **TRICHACHNE** (p. 619).
Racemes close, 1-sided, solitary, digitate or racemose.
Racemes racemosely arranged on the main axis.
77. PANICUM (p. 646).
Racemes digitate or fascicled, rarely solitary
68. DIGITARIA (p. 620).

13. ANDROPOGONEAE

Spikelets all perfect.
Inflorescence of solitary racemes at the ends of the branches.
98. POLYTRIAS (p. 686).
Inflorescence of 2 to several digitate racemes___109. **ISCHAEMUM** (p. 698).
Inflorescence a dense or somewhat open woolly, white or pinkish panicle.
Rachis continuous, the spikelets falling; spikelets of the pair unequally pedicellate_____95. **IMPERATA** (p. 685).
Rachis breaking up into joints at maturity with the awnless spikelets attached; one spikelet sessile, the other pedicellate.
96. SACCHARUM (p. 686).
Spikelets not all perfect, the sessile usually perfect, the pedicellate usually staminate or rudimentary (perfect in *Eriochrysis*).
Pedicel thickened, appressed to the thickened rachis joint (at least parallel to it) or adnate to it; spikelets awnless, appressed to the joint.
Rachis joint and pedicel adnate, forming a short flat joint, this sunken in the open side of the globose first glume of the sessile spikelet; sterile spikelet conspicuous_____110. **HACKELOCHLOA** (p. 698).
Rachis joint and pedicel distinct, the sessile spikelet appressed to them, its first glume lanceolate.
Racemes subcylindric; rachis joints and pedicels glabrous, much thicker at the summit, the spikelets sunken in the hollow below; sterile spikelet rudimentary_____111. **ROTTBOELLIA** (p. 699).
Racemes flat; rachis joints and pedicels woolly, not much thicker at the summit; sterile spikelet staminate or neuter.
108. **ELYONURUS** (p. 697).
Pedicel not thickened (if slightly so the spikelets awned), neither appressed nor adnate to the rachis joint, this usually slender; spikelets usually awned.
Fertile spikelet with a hairy-pointed callus, formed of the attached supporting rachis joint or pedicel; awns strong. (See also *Hyparrhenia ruprechtii.*)
Primary spikelet subsessile, sterile, persistent on the continuous axis after the fall of the fertile pedicellate spikelet, the pedicel forming the callus_____107. **TRACHYPOGON** (p. 697).
Primary spikelet sessile, fertile; pedicellate spikelet sterile; lower few to several pairs of spikelets all staminate or neuter.
106. **HETEROPOGON** (p. 696).
Fertile spikelet without a callus, the rachis disarticulating immediately below the spikelet; awn slender or wanting.
Inflorescence a dense golden-brown silky panicle; spikelets awnless, the pedicellate one perfect_____97. **ERIOCHRYSIS** (p. 686).

Inflorescence not a dense golden-brown silky panicle; pedicellate spikelet staminate or rudimentary.
Racemes reduced to one or few joints, these mostly peduncled in a subsimple or compound panicle.
Pedicellate spikelets staminate----------104. **SORGHUM** (p. 695).
Pedicellate spikelets wanting, the pedicel only present.
105. SORGHASTRUM (p. 695).
Racemes of several to many joints, solitary, digitate, or aggregate.
Inflorescence an elongate panicle of whorled long-peduncled slender glabrous racemes; spikelets muricate, awnless.
103. VETIVERIA (p. 694).
Inflorescence not a panicle of long-peduncled racemes; spikelets not muricate; racemes often conspicuously woolly.
Margins of the first glume of the sessile spikelet involute, the sides rounded instead of sharply keeled.
102. HYPARRHENIA (p. 693).
Margins of the first glume of the sessile spikelet inflexed, the glume sharply 2-keeled, the back flat or grooved between the keels.
Pedicellate spikelets much larger than the sessile, almost concealing them, the first glume large and flat; racemes solitary on the branches----------100. **DIECTOMIS** (p. 692).
Pedicellate spikelets sometimes as large as the sessile, usually smaller, the first glume not large and flat.
Racemes in pairs subtended or inclosed by a broad spathe, aggregate in large compound panicles, the lowest pair of spikelets of one of the racemes alike, staminate or neuter. Aromatic grasses----------101. **CYMBOPOGON** (p. 692).
Racemes single, in pairs, digitate, or numerous, sometimes supported by spathes; lowest pairs of spikelets like the upper, one fertile and sessile, the other pedicellate, staminate or reduced----------99. **ANDROPOGON** (p. 687).

14. TRIPSACEAE

Staminate and pistillate spikelets in separate inflorescences, the first in a terminal tassel, the second in the axils of the leaves.
Pistillate spikes distinct, the spikelets embedded in the hardened rachis, this disarticulating at maturity----------114. **EUCHLAENA** (p. 701).
Pistillate spikes grown together forming an ear, the grains at maturity much exceeding the glumes----------115. **ZEA** (p. 702).
Staminate and pistillate spikelets in separate portions of the same spike, the pistillate below.
Spikes short, the 1 or 2 flowered pistillate portion inclosed in a beadlike sheathing bract----------113. **COIX** (p. 701).
Spikes many-flowered, the pistillate portion breaking up into several 1-seeded joints; no beadlike sheathing bract----------112. **TRIPSACUM** (p. 700).

DESCRIPTIVE LIST

1. BAMBUSA Retz. Obs. Bot. 5: 24. 1789. [As Bambos]

Spikelets several to many-flowered, sessile, solitary or in clusters on an elongate axis or the branches of a panicle, the glumes and sterile lemmas per-

sistent after the fall of the florets; glumes small; lemmas firm, sharp-pointed or awn-tipped; keels of palea projecting but not winged; stamens 6. Large usually erect bamboos of the Old World. Species about 30.

1. **Bambusa vulgaris** Schrad.; Wendl. Coll. Pl. 2: 26, *pl. 47*. 1808.

The common large bamboo of Asia is cultivated in tropical America at low altitudes. It grows in large erect clumps 10 meters or more in height, the culms 10 cm. in diameter. The culms are at first green but turn yellow. The branches are not spiny. One variety, *B. vulgaris striata* (Ladd.) Gamble, has culms striped green and yellow.

A second species (*B. nana* Roxb. Fl. Ind. 2: 199. 1832) is sometimes cultivated for hedges. It is an erect delicate species 2 or 3 meters tall when untrimmed, with glaucous foliage, the distichous blades 1 to 3 cm. long.

2. GUADUA Kunth, Syn. Pl. Aequin. 1: 252. 1822

Spikelets several-flowered, subterete; stamens 6; keels of palea winged. Usually tall bamboos, often spiny. Species about 15, Mexico to Brazil.

1. **Guadua aculeata** Rupr.; Fourn. Compt. Rend. Acad. Sci. (Paris) 84: 198. 1877.

Sterile specimens from Guatemala, Honduras, and Panama appear to be this species. Culms as much as 13 meters tall and 10 cm. in diameter, the branches spiny.

3. ARUNDINARIA Michx. Fl. Bor. Amer. 1: 73. 1803

Spikelets few to many-flowered, usually large, compressed or sometimes terete, the rachilla disarticulating above the glumes and between the florets; glumes unequal, shorter than the lemmas, the first sometimes wanting; lemmas acute or acuminate or mucronate, faintly many-nerved; palea about as long as the lemma, prominently 2-keeled. Shrubs or tall reeds, with woody perennial branching culms, flat blades with petioles articulate with the sheaths, and loose racemes or panicles. Species probably 50 or more, in the Tropics of both hemispheres.

Inflorescence a large, open, diffuse panicle_____1. A. viscosa.
Inflorescence a zigzag raceme_____2. A. standleyi.

1. **Arundinaria viscosa** Hitchc. Proc. Biol. Soc. Washington 40: 79. 1927.

Culms erect, rather slender, 2 to 4 meters tall, mottled with purple, more or less branched below; blades 10 to 20 cm. long, 3 to 5 cm. wide, glabrous on the upper surface, scaberulous and glaucous beneath, the petiole 2 to 3 mm. long; panicle large and diffuse, 15 to 20 cm. long and about as wide, the branches and axis viscid, the branches solitary, slender, spreading, the spikelets on the branchlets of the third or fourth order; spikelets 1.5 to 2.5 cm. long, compressed, 3 to 6 flowered, mottled with purple, rather soft and papery; lemmas faintly several-nerved, minutely pubescent, acute, awnless, 10 to 15 mm. long.

Costa Rica (type from the summit of Velirla del Copey); wet forests at 1,800 to 2,700 meters altitude, Costa Rica and Venezuela.

2. **Arundinaria standleyi** Hitchc. Proc. Biol. Soc. Washington 40: 79. 1927.

Culms glabrous, branching, slender, erect, pendent or procumbent, as much as 3 meters long, about 1.5 mm. thick; sheaths rather sparsely fimbriate at the throat; blades 8 to 12 cm. long, 1 to 2 cm. wide; racemes terminating short leafy branches, 5 to 8 cm. long, the rachis slender, strongly zigzag, mostly 1 to 1.5 cm. long, diverging sharply at the base of each spikelet; spikelets on very short pedicels, slender, terete, straight, 1 to 2 cm. long, less than 1 mm. wide, 4 to 8

flowered; lemmas minutely pubescent, 9-nerved, about 6 mm. long, narrowed to an obtuse point, awnless.

Costa Rica (type from Río Navarro, Province of Cartago, 1,400 to 1,500 meters); wet forests.

4. ARTHROSTYLIDIUM Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. 3[1]: 117. 1839

Spikelets few-flowered, in racemes, the lower 1 or 2 lemmas empty, the rachilla disarticulating between the florets (rarely below the glumes); stamens 3. Mostly climbing or trailing shrubs, the short fertile branches in fascicles on the main cane. Species about 30 in warm temperate and tropical regions.

Blades on fertile shoots 7 to 12 mm. wide_____1. A. pittieri.
Blades on fertile shoots mostly less than 6 mm. wide.
  Racemes 5 to 8 cm. long; spikelets appressed_____2. A. racemiflorum.
  Racemes mostly less than 2 cm. long; spikelets divergent_____3. A. maxonii.

1. **Arthrostylidium pittieri** Hack. Oesterr. Bot. Zeitschr. 53: 75. 1904.

Main cane as much as 6 mm. in diameter; fertile shoots in dense fascicles, as much as 40 cm. long; sheaths glabrous, the summit naked or with a few bristles, the margin glabrous or nearly so; blades 7 to 12 cm. long, 7 to 12 mm. wide, glabrous, slightly pubescent beneath near base, scabrous on the margin; racemes pale, 1-sided, somewhat curved, 5 to 10 cm. long, closely flowered, the spikelets appressed, the rachis glabrous; spikelets 1.5 to 2 cm. long, with one sterile lemma, mostly 3 fertile florets, and a reduced floret above; first glume narrow, 2 to 3 mm. long, 1 to 3 nerved; second glume 4 mm. long, broad, 7-nerved; sterile lemma about 6 mm. long, about 9-nerved, mucronate or short-awned; fertile lemmas about 1 cm. long, short-awned.

Guatemala, Costa Rica (type from near San José); wooded hillsides, up to 1,200 meters.

2. **Arthrostylidium racemiflorum** Steud. Syn. Pl. Glum. 1: 336. 1854.

Main cane up to about 6 mm. in diameter, as much as 5 meters long, climbing; fertile shoots slender, 10 to 30 cm. long; blades on fertile shoots 5 to 7 cm. long, 4 to 6 mm. wide, somewhat glaucous beneath, densely pubescent beneath at base, sometimes minutely pubescent on the surfaces; racemes 5 to 8 cm. long, the spikelets appressed, the rachis pubescent; lemmas 7-nerved, 6 mm. long with an awn 1 to 2 mm. long; palea longer than the body of the lemma, strongly ciliate on the keels.

Guatemala, El Salvador, Costa Rica, Panama; wooded slopes and moist thickets, at low and medium altitudes. Mexico, whence the type, to Colombia.

3. **Arthrostylidium maxonii** Hitchc. Proc. Biol. Soc. Washington 40: 80. 1927.

Main canes slender, erect or climbing, as much as 4 meters long; fertile shoots very slender, 10 to 20 cm. long; sheaths bearing at summit several slender bristles as much as 5 mm. long; blades delicate, 1 to 3 cm. long, about 3 mm. wide; racemes 1-sided, 1 to 1.5 cm. long, the spikelets almost sessile, divergent from the glabrous axis horizontally or nearly so, spikelets 8 to 10 mm. long, terete; fertile lemmas 2 or 3, acuminate but not awned, pubescent, 5-nerved.

Costa Rica (type from Santa Clara de Cartago, 1,950 meters); forested slopes.

5. CHUSQUEA Kunth, Syn. Pl. Aequin. 1: 254. 1822

Spikelets terete or nearly so, with 2 small or minute (sometimes obsolete) glumes, and 2 sterile lemmas usually shorter than the single fertile floret.

Erect or climbing shrubs, the fertile shoots often in fascicles on the usually slender main culm; the panicles usually condensed, sometimes spikelike, rarely open. Species about 40, Mexico to Chile.

Panicle open, the spikelets on spreading pedicels----------1. C. heydei.
Panicles narrow, more or less condensed.
  Blades tessellate-veined----------8. C. subtessellata.
  Blades not tessellate-veined or only slightly so.
  Panicles 1 to 2 cm. long, usually reduced to a simple raceme of 1 to 4 spikelets----------2. C. simpliciflora.
  Panicles mostly more than 5 cm. long.
    Glumes nearly obsolete; blades about 2 cm. wide and less than 10 cm. long----------3. C. virgata.
    Glumes evident, as much as 0.5 mm. long; blades more than six times as long as wide.
    Main branches of panicle spreading or ascending----------4. C. tonduzii.
    Main branches of panicle appressed, the panicle condensed.
      Blades as much as 2 cm. wide; panicles usually more than 15 cm. long----------5. C. lehmannii.
      Blades usually not more than 1 cm. wide; panicles usually less than 15 cm. long.
        Blades lanceolate, those of the fertile shoots 4 to 6 cm. long. 6. C. pittieri.
        Blades linear-lanceolate, as much as 15 cm. long----7. C. serrulata.

1. Chusquea heydei Hitchc. Proc. Biol. Soc. Washington 40: 80. 1927.

Central culm as much as 5 mm. in diameter; fertile shoots in fascicles on the central culm, slender, 10 to 20 cm. long, the lower part with bladeless sheaths, the upper part with one or two foliage leaves; blades of fertile shoots lanceolate, thin, 2 to 5 cm. long, 4 to 8 mm. wide; panicles ovoid, open, 6 to 8 cm. long, the branches single, spreading, the spikelets on branches of second or third order, all spreading; spikelets elliptic, strongly nerved, glabrous, 8 to 9 mm. long, about 2 mm. wide; fertile lemma acute, prominently 9-nerved.

Guatemala (type from Santa Rosa, 3,000 to 4,000 meters); also Mexico.

2. Chusquea simpliciflora Munro, Trans. Linn. Soc. 26: 54. 1868.

High climbing but slender, the main culm scarcely more than 2 mm. in diameter; fertile shoots fascicled on the main culm, 5 to 15 cm. long; sheaths finely fimbriate at summit; blades lanceolate, 2 to 6 cm. long, 5 to 10 mm. wide, glabrous, hirsutulous near base beneath; panicles short, usually a simple raceme of 1 to 4 spikelets, the angled axis glabrous; spikelets pale, soft, acute, glabrous, 7 to 10 mm. long, the pedicels short; glumes minute, less than 1 mm. long; fertile lemma acuminate.

Guatemala (Cubilquitz); Costa Rica (Rio Naranjo); Panama (type from "L'on Hill Station"); dense wet forest at low altitudes.

3. Chusquea virgata Hack. Oesterr. Bot. Zeitschr. 53: 156. 1903.

Central cane as much as 5 mm. in diameter; fertile shoots in fascicles on the main cane, 25 to 30 cm. long; sheaths glabrous throughout or sometimes the collar with a few cilia; blades lanceolate, rather firm, 5 to 7 cm. long, 1 to 2 cm. wide, glabrous, somewhat pilose near the base beneath; panicles narrow, virgate, contracted, rather loosely flowered, 12 to 15 cm. long, the axis glabrous, the branches appressed, these and the pedicels very slender, glabrous; spikelets narrow, about 1 cm. long, glabrous, pale, divergent, somewhat curved, glumes minute, less than 0.5 mm. long, rounded; sterile lemmas about equal,

less than half as long as the spikelet, acuminate but not awned; fertile lemma acute but not awned, the palea about as long.

Costa Rica, known only from San Marcos, 1,355 meters (the type), and El Copey.

4. Chusquea tonduzii Hack. Oesterr. Bot. Zeitschr. 53: 155. 1903.

Climbing and straggling, the central cane as much as 4 mm. in diameter; fertile shoots fascicled on the main culm, 15 to 30 cm. long; sheaths glabrous except the ciliate margins and finely fimbriate summit; ligule 1 to 3 mm. long; blades of fertile shoots 10 to 15 cm. long, 10 to 12 mm. wide, glabrous, firm; panicles 10 to 15 cm. long, the branches ascending or somewhat spreading, as much as 5 cm. long, floriferous from base, the rachis and branches crisp-pubescent, terete or obtusely angled; spikelets more or less spreading, short-pediceled, glabrous, acute, brownish, 6 to 7 mm. long; glumes small, rounded, unequal, the second about 1 mm. long; sterile lemmas about half as long as the spikelet, pungently apiculate; fertile lemma awn-pointed, the palea a little longer, minutely pubescent on the keels.

Costa Rica, known only from the type collection, summit of Volcán Poás.

This species is close to *C. scandens* Kunth of Colombia to Peru, differing chiefly in the pubescent, scarcely angled axis of the panicle. Hackel describes the plant as being 30 to 50 cm. tall with a terminal panicle. His specimen was probably a single fertile shoot broken from a fascicle.

5. Chusquea lehmannii Pilger, Bot. Jahrb. Engler 27: 35. 1899.

Chusquea pilgeri E. G. Camus, Bamb. Monogr. 83. 1913.

Plants erect or subscandent, as much as 7 meters tall, branching, the branches erect; sheaths glabrous or papillose; blades as much as 18 cm. long and 2 cm. wide, acuminate, cuneate at base, glabrous beneath, glabrous or scabrous on the upper surface; panicle narrow, elongate, as much as 30 cm. long, the branches appressed; spikelets appressed, about 7 mm. long; glumes short, about 1 mm. long; sterile lemmas half to two-thirds as long as the spikelet, apiculate, more or less pubescent; fertile lemma apiculate, pubescent toward the apex.

Costa Rica (Las Nubes, 1,500 to 1,900 meters; Volcán de Poás, 2,500 to 2,640 meters); wet forests. Also Colombia, whence the type.

6. Chusquea pittieri Hack. Oesterr. Bot. Zeitschr. 53: 153. 1903.

Central culm as much as 4 mm. in diameter, glabrous; fertile shoots numerous in dense fascicles on the main culm, 10 to 20 cm. long, part of the shoots bearing foliage leaves, a part bearing sheaths only; sheaths glabrous, ciliate on the margin above, the summit more or less ciliate but scarcely fimbriate; ligule firm, about 1 mm. long; blades of fertile shoots firm, lanceolate, 4 to 6 cm. long, 6 to 8 mm. wide; panicles tawny, narrow, nearly simple, 3 to 6 cm. long, the rachis glabrous; spikelets about 1 cm. long, glabrous; glumes minute, less than 1 mm. long, firm, rounded or truncate, nerveless; sterile lemmas similar, membranaceous, apiculate, 7 to 9 nerved, half to two-thirds the length of the spikelet; fertile lemma firm, acute, apiculate, 11-nerved; palea nearly as long as the lemma.

Costa Rica (Cuesta de los Arrepentidos between San Marcos and Santa María de Dota, 1,400 meters, the type).

7. Chusquea serrulata Pilger, Bot. Jahrb. Engler 25: 719. 1898.

Chusquea spadicea Pilger, Bot. Jahrb. Engler 27: 35. 1899.

Central cane as much as 4 mm. in diameter, 3 to 6 meters tall; fertile shoots fascicled on the main cane, 20 to 40 cm. long; blades of fertile shoots narrow, 5 to 15 cm. long, 4 to 7 mm. wide; panicles narrow, condensed but scarcely spike-

like, mostly 7 to 10 cm. long, the rachis angled, glabrous; spikelets 10 to 12 mm. long; glumes glabrous, small, firm, rounded, somewhat unequal, 0.5 to 1 mm. long; first sterile lemma minutely puberulent, apiculate, about half as long as the spikelet, the second similar, about as long as the spikelet; fertile lemma firm, short-awned.

Costa Rica (Cerro de las Vueltas, 2,700 to 3,000 meters, Volcán de Poás, 1,700 meters); Panama, (Chiriquí Volcano, 1,300 to 2,500 meters); wet forest. Also Colombia, whence the type.

8. **Chusquea subtessellata** Hitchc. Proc. Biol. Soc. Washington 40: 81. 1927.

Erect shrub 1 to 3 meters tall, the branches erect; sheaths pubescent, becoming glabrous; blades appressed, firm, linear-lanceolate, as much as 10 cm. long and 1 cm. wide, glabrous, tessellate-veined especially beneath, rounded to a nearly sessile base, the apex acuminate to a firm rather rigid point, the margin indurate and scabrous; panicles narrow, condensed, but scarcely spike-like, 7 to 10 cm. long, dark purple, the rachis and appressed branches pubescent; spikelets glabrous, 5 to 6 mm. long; glumes obtuse, the first 1 mm., the second 2 mm. long; sterile lemmas apiculate, 5-nerved, nearly as long as the spikelet; fertile lemma apiculate, obscurely 5-nerved, the palea a little shorter.

Costa Rica (Cerro de la Muerta, the type, and Cerro de las Vueltas, 2,700 to 3,000 meters), paramos. A third specimen is doubtfully referred to this species, *Pittier* 3069, from El Potrero Camp, Chiriquí Volcano, Panama, altitude 2,800 to 3,000 meters. The panicles are less condensed, and the branches less appressed.

The species is allied to *C. tessellata* Munro, but differs in the less spicate inflorescence.

6. STREPTOCHAETA Schrad.; Nees, Agrost. Bras. 536. 1829

Spikelets 1-flowered, terete, disarticulating below the glumes; empty bractlets (probably glumes and sterile lemmas) 4, much shorter than the spikelet, more or less toothed; lemma coriaceous, gradually narrowed into a long much contorted awn; palea shorter than the lemma, bifid nearly to the base, coriaceous; inner bracts (lodicules) 3, less coriaceous than the lemma, longer than the palea, imbricate; stamens 6, monadelphous, the tube about as long as the lemma; style 1, as long as the stamen tube, the slender stigmas 3. Broad-leaved perennials with the spikelets in elongate spikes. The long contorted awns are implicate, remaining attached at the apex of the axis, the spikelets hanging down. Species 2, tropical America.

Spikelets, excluding awns, about 14 mm. long ..... 1. S. sodiroana.
Spikelets, excluding awns, about 22 mm. long ..... 2. S. spicata.

1. **Streptochaeta sodiroana** Hack. Oesterr. Bot. Zeitschr. 40: 113. 1890.

Culms about 1 meter tall; blades elliptic, tessellate, 15 to 20 cm. long, 6 to 7 cm. wide; spike many-flowered, dense, about 30 cm. long.

Honduras, Costa Rica, Panama; wet forest, at low altitudes. Also Ecuador, whence the type.

2. **Streptochaeta spicata** Schrad.; Nees, Agrost. Bras. 537. 1829.

Lepideilema lancifolium Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 1: 93. 1830.

Differing from *S. sodiroana* in the few-flowered slender spike of larger spikelets.

Panama; wet forest at low altitudes. Trinidad to Ecuador and Brazil, whence the type.

7. BROMUS L. Sp. Pl. 76. 1753. Bromegrass

Spikelets several to many flowered, the rachilla disarticulating above the glumes and between the florets; glumes unequal, acute, the first 1 to 3 nerved, the second usually 3 to 5 nerved; lemmas convex on the back or keeled, 5 to 9 nerved, 2-toothed at the apex, awnless or usually awned from between the teeth; palea usually shorter than the lemma, ciliate on the keels. Annuals or perennials with closed sheaths, flat blades, and open or contracted panicles of large spikelets. Species about 100, in temperate regions.

First glume 1-nerved; lemma pubescent all over----------1. B. exaltatus.
First glume 3-nerved; lemma pubescent on the margins, glabrous or scaberulous on the back----------2. B. laciniatus.

1. Bromus exaltatus Bernh. Linnaea 15: Litt. 90. 1841.

Slender perennial about 1 meter tall; blades flat, scabrous, 3 to 4 mm. wide, panicles open, nodding, 10 to 15 cm. long, the slender branches drooping, naked below, 3 to 5 cm. long, bearing 1 or 2 spikelets; glumes narrow, unequal, the first 8 to 9 mm. long, 1-nerved or indistinctly 3-nerved; lemmas pubescent, about 1.5 cm. long, the awn 4 to 7 mm. long.

Guatemala (Volcán de Agua, 3,500 meters), Panama (Chiriqui Volcano, 3,000 meters); paramos at high altitudes. Mexico, whence the type, to Panama.

2. Bromus laciniatus Beal, Grasses N. Amer. 2: 615. 1896.

Bromus pendulinus Sessé; Lag. Gen. & Sp. Nov. 4. 1816. Not *B. pendulinus* Schrad. 1810.

Bromus proximus Shear, Bull. Torrey Club 28: 245. 1901.

Similar to *B. exaltatus;* first glume distinctly 3-nerved; lemmas more or less pubescent near the margin, glabrous or scaberulous on the back.

Guatemala, Costa Rica; grassy slopes at middle altitudes. Also Mexico, whence the type.

8. BRACHYPODIUM Beauv. Ess. Agrost. 100, 155. 1812

Spikelets many-flowered, narrow, nearly terete, short-pediceled in a simple raceme; lemmas usually awned from the tip, 7 to 9 nerved; palea with stiffly ciliate keels. Slender branching annuals or usually perennials with usually flat blades. Species 6 in the temperate regions of the Eastern Hemisphere, two in the mountains of tropical America.

1. Brachypodium mexicanum Link, Hort. Berol. 1: 41. 1827.

Slender wiry straggling perennial; blades flat; racemes about 5 cm. long; spikelets 1.5 to 2 cm. long, rather distant, at first appressed, finally spreading or reflexed.

Guatemala, Costa Rica, Panama; thickets and shady banks at rather high altitudes. Mexico, whence the type, to Bolivia.

9. FESTUCA L. Sp. Pl. 73. 1753. Fescue

Spikelets few to several flowered, the rachilla disarticulating above the glumes and between the florets; glumes narrow, acute, unequal, the first sometimes very small; lemmas rounded on the back, membranaceous or somewhat indurate, 5-nerved, the nerves often obscure, acute or rarely obtuse, awned from the tip or rarely from a minutely bifid apex. Central American species perennials with narrow or open panicles. Species about 100, in the temperate and cool regions.

Blades flat, 4 to 8 mm. wide.
Panicles rather narrow, some of the branches floriferous from near the base; spikelets 6 to 8 flowered_____1. F. elatior.
Panicles open, the branches spreading or drooping, naked below; spikelets 3 to 5 flowered.
Lemmas 6 to 7 mm. long, awnless_____2. F. amplissima.
Lemmas 12 mm. long, awn-pointed_____3. F. eminens.
Blades involute.
Blades scabrous.
Blades mostly less than 10 cm. long; panicle narrow, 4 to 6 cm. long, the branches appressed_____4. F. hephaestophila.
Blades elongate; panicle open, 10 to 20 cm. long, the branches drooping. 5. F. tolucensis.
Blades glabrous.
Culms densely cespitose, erect; panicle 10 to 15 cm. long_6. F. dolichophylla.
Culms loose and decumbent at base; panicle 5 to 7 cm. long___7. F. rubra.

1. Festuca elatior L. Sp. Pl. 75. 1753. MEADOW FESCUE.

Culms smooth, 50 to 120 cm. tall; sheaths smooth; blades flat, 4 to 8 mm. wide, scabrous above; panicle erect, or nodding at summit, 10 to 20 cm. long, contracted after flowering, much-branched or nearly simple, the branches spikelet-bearing nearly to base; spikelets usually 6 to 8 flowered, 8 to 12 mm. long; lemmas oblong-lanceolate, coriaceous, 5 to 7 mm. long, the scarious apex acutish, rarely short-awned.

Costa Rica; pastures at upper altitudes. A European species cultivated in the temperate parts of America, and naturalized in cool regions.

2. Festuca amplissima Rupr. Bull. Acad. Sci. Brux. 9²: 236. 1842. (nomen seminudum); Fourn. Mex. Pl. 2: 125. 1886.

Culms erect, stout, 1 to 2 meters tall; blades flat, scabrous, 5 to 8 mm. wide; panicles nodding, 15 to 25 cm. long, the branches spreading or drooping, very scabrous, naked below, as much as 15 cm. long; spikelets about 1 cm. long, about 5-flowered; lemmas 6 to 7 mm. long, scaberulous, acute, awnless.

Guatemala (Volcán de Agua); Panama (Chiriquí Volcano, 2,700 meters); open woods and savannas at rather high altitudes. Mexico, whence the type, and Central America.

3. Festuca eminens Kunth, Rév. Gram. 1: 132. 1829.

Culms rather stout, 1 to 2 meters tall; sheaths scabrous; blades flat, scabrous, 4 to 8 mm. wide; panicles open, nodding, 10 to 25 cm. long, the slender scabrous branches spreading or drooping, naked below, few-flowered toward the ends; spikelets about 1.5 cm. long, 3 or 4 flowered; glumes narrow, 9 and 12 mm. long; lemmas about 12 mm. long, scaberulous, distinctly nerved, tapering into an awn 1 to 2 mm. long.

Panama (Chiriquí Volcano, 1,300 to 2,700 meters); savannas and open woods. Panama to Ecuador, whence the type.

4. Festuca hephaestophila Nees; Steud. Syn. Pl. Glum. 1: 310. 1854.

Festuca tolucensis var. *hephaestophila* Nees; Hook. Journ. Bot. Kew Misc. 2: 105. 1850.

Culms densely cespitose, erect, 10 to 40 cm. tall with involute mostly basal scabrous blades usually less than 10 cm. long; culm blade one, about 5 cm. long; panicle narrow, 4 to 6 cm. long, mostly dark-colored, the branches short, appressed, few-flowered; spikelets 5 to 7 mm. long, mostly 3 or 4 flowered; glumes narrow, acute; lemmas about 5 mm. long, acute or awn-tipped.

Guatemala (crater of Volcán de Agua, whence the type): open ground at high altitudes. Also Mexico.

5. **Festuca tolucensis** H. B. K. Nov. Gen. & Sp. 1: 153. 1816.

Culms erect, 50 to 100 cm. tall, in large dense bunches; blades slender, elongate, involute, scabrous, rather lax or flexuous, about 0.5 mm. thick; panicles open, somewhat nodding, 10 to 20 cm. long, the few distant branches slender, flexuous, drooping, scabrous, naked below, few-flowered; spikelets about 1.5 cm. long, mostly 6 to 8 flowered; lemmas obscurely nerved, 6 to 8 mm. long, scaberulous, acuminate or slightly awn-tipped.

Costa Rica (Volcán de Irazú); paramos and subalpine regions. Also Mexico, whence the type.

6. **Festuca dolichophylla** Presl, Rel. Haenk. 1: 258. 1830.

Culms cespitose, erect, 50 to 100 cm. tall; blades glabrous, firm, involute, 1 to 1.5 mm. thick, panicles erect, open, rather narrow, 10 to 15 cm. long, the branches ascending, naked at base; spikelets mostly 8 to 10 mm. long, mostly 3 to 5 flowered; lemmas scaberulous, 6 to 7 mm. long, acuminate or awn-tipped.

Panama (Chiriquí Volcano, 2,700 to 3,300 meters); paramos and subalpine regions at high altitudes. Panama to Chile, the type from Peru.

7. **Festuca rubra** L. Sp. Pl. 74. 1753 RED FESCUE

Loosely cespitose, the culms decumbent and often reddish at base; blades soft, smooth, loosely involute; panicles open, 5 to 7 cm. long, the few branches ascending or appressed or the lower spreading and naked at base; spikelets about 1 cm. long, 4 or 5 flowered; lemmas glabrous, bearing an awn shorter than the body.

Costa Rica (Volcán de Turrialba); pastures at high altitudes, probably introduced with grass seed. Eurasia and northern North America, extending south in the mountains. Sometimes cultivated for pasture.

10. POA L. Sp. Pl. 67. 1753. BLUEGRASS

Spikelets 2 to several-flowered, the rachilla disarticulating above the glumes and between the florets, the uppermost floret reduced or rudimentary; glumes acute, keeled, somewhat unequal, the first 1-nerved, the second usually 3-nerved; lemmas somewhat keeled, acute or acutish, awnless, membranaceous, often somewhat scarious at the tip, 5-nerved, the nerves sometimes pubescent. Annual, or usually perennial, species of low or rather tall grasses, with spikelets in open or contracted panicles, the narrow blades flat or folded, ending in a navicular point. Species probably more than 200, in the temperate and cool regions.

Plants annual.....1. P. annua.
Plants perennial.
  Lemmas pubescent.....2. P. pratensis.
  Lemmas glabrous.....3. P. seleri.

1. **Poa annua** L. Sp. 68. 1753. ANNUAL BLUEGRASS.

Poa infirma H. B. K. Nov. Gen. & Sp. 1: 158. 1816.

Low tufted soft smooth annual; culms decumbent at base; panicles commonly about 5 cm. long, pale, open; spikelets crowded, 3 to 6 flowered, about 4 mm. long; lemma not webbed at base, distinctly 5-nerved, the nerves pilose on the lower half.

Guatemala, Costa Rica; open ground at medium and high altitudes, often on the summits of the highest peaks. Common in temperate regions of both hemispheres, introduced in America.

2. Poa pratensis L. Sp. Pl. 67. 1753. KENTUCKY BLUEGRASS.

Erect perennial, with creeping rhizomes; culms 30 to 50 cm. tall; panicles open, 4 to 10 cm. long, the lower branches 3 to 5, spreading; spikelets 3 to 5 flowered, 4 to 5 mm. long; lemmas 3 mm. long, copiously webbed at base, silky-pubescent on keel and marginal nerves, the intermediate nerves prominent.

Costa Rica; pastures at upper altitudes. Temperate regions of both hemispheres, introduced in America.

3. Poa seleri Pilger, Verh. Bot. Ver. Brand. **51**: 195. 1909.

Poa guatemalensis Hitchc. Proc. Biol. Soc. Washington **40**: 81. 1927.

Perennial, apparently with creeping rhizomes; culms decumbent at base, about 40 cm. tall, the nodes mostly 3 or 4; sheaths minutely scaberulous; blades lax, 1 to 2 mm. wide, glabrous, slightly scabrous on the upper surface; panicle open, 6 to 8 cm. long, the axis glabrous or somewhat scabrous above, the branches mostly in pairs, slender, flexuous or drooping, naked below, 2 to 3 cm. long, bearing a few spikelets on the upper half; spikelets 4 to 5 mm. long, mostly 2 or 3 flowered, the rachilla glabrous; glumes 1.5 and 2 mm. long; lemmas 3 mm. long, 1 mm. wide, glabrous throughout, somewhat compressed, rather indistinctly nerved, acute, purple-tinged at summit.

Guatemala (type from Volcán de Agua), open woods, 2,000 to 3,500 meters altitude.

11. BRIZA L. Sp. Pl. 70. 1753. QUAKING GRASS

Spikelets several-flowered, broad, often cordate, the florets crowded and spreading horizontally, the rachilla disarticulating above the glumes and between the florets, the uppermost floret reduced; glumes about equal, broad, papery-chartaceous, with scarious margins; lemmas papery, broad, with scarious, spreading margins, cordate at base, several-nerved, the nerves often obscure, the apex in our species obtuse or acutish; palea much shorter than the lemma. Annuals or perennials, with erect culms, flat blades, and usually open, showy panicles. Species about 20, the greater number South American.

1. Briza minor L. Sp. Pl. 70. 1753.

Weak-stemmed annual 30 to 50 cm. tall; blades flat, scabrous; and panicles loosely flowered, the branchlets subcapillary but stiffly spreading; spikelets triangular-ovate, nodding.

Costa Rica (Cartago); moist meadows, 1,500 meters. A European species introduced in the temperate parts of America.

12. ERAGROSTIS Host, Icon. Gram. Austr. **4**: 14. *pl. 24*. 1809

Spikelets few to many-flowered, the florets usually closely imbricate, the rachilla disarticulating above the glumes and between the florets, or continuous, the lemmas deciduous, the paleas persistent; glumes somewhat unequal, acute or acuminate, 1-nerved, or the second rarely 3-nerved; lemmas acute or acuminate, keeled or rounded on the back, 3-nerved, the nerves usually prominent; palea 2-nerved, the keels sometimes ciliate. Annuals or perennials with open or contracted panicles. Species more than 100, tropical and temperate regions.

Plants perennial.

Ultimate pedicels longer than the spikelets; panicle open and spreading.
12. E. lugens.

Ultimate pedicels shorter than the spikelets; panicles more or less condensed.

Lemmas acuminate. Spikelets more or less appressed along the main branches of the panicle ---------- 13. E. acutiflora.

Lemmas acute or acutish.
Panicle usually purplish, the spikelets more or less glomerate, prominently 3-nerved; lemmas closely imbricate, hiding the rachilla.
15. E. secundiflora.
Panicle pale, large, as much as 30 cm. long, the spikelets aggregate along the branches but not glomerate, obscurely nerved; lemmas loosely imbricate, exposing the rachilla----------14. E. prolifera.

Plants annual.
Palea prominently ciliate on the keels, the cilia usually as long as the width of the lemma.
Panicle interruptedly spikelike or condensed----------1. E. ciliaris.
Panicle narrow but open.
Axis and branches viscid----------3. E. viscosa.
Axis and branches not viscid----------2. E. amabilis.
Palea not prominently ciliate on the keels.
Plants creeping and branching, forming mats----------6. E. hypnoides.
Plants not forming mats.
Lemmas glandular on the keels; spikelets about 3 mm. wide.
7. E. cilianensis.
Lemmas not glandular; spikelets less than 3 mm. wide.
Panicle elongate, contracted, the minute spikelets crowded or glomerate.
8. E. glomerata.
Panicle not elongate.
Spikelets sessile or nearly so, fascicled on the branches.
Lemmas about 5 mm. long, narrow----------5. E. simpliciflora.
Lemmas about 2.5 mm. long----------4. E. maypurensis.
Spikelets pediceled in an open panicle.
Main branches of panicle glabrous in the axils; panicle erect, the branches rather stiff----------11. E. limbata.
Main branches of panicle, at least the lower, pilose in the axils; panicle lax or drooping.
Spikelets about 1.5 mm. wide----------9. E. tephrosanthos.
Spikelets about 2 mm. wide----------10. E. mexicana.

1. Eragrostis ciliaris (L.) Link, Hort. Berol. 1: 192. 1827.
Poa ciliaris L. Syst. Nat. ed. 10. 2: 875. 1759.
Erect or spreading annual; culms slender, 15 to 40 cm. tall; blades flat, 1 to 3 mm. wide; panicles condensed, usually interrupted, sometimes rather loose, 5 to 15 cm. long; spikelets subsessile, crowded, about 2 mm. long, mostly 6 to 8 flowered, the palea prominently ciliate.
Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; open ground, waste places, fields, and sandy seashores, at low altitudes. Warmer regions of both hemispheres, apparently introduced in America. Type from Jamaica.

2. Eragrostis amabilis (L.) Wight & Arn.; Hook & Arn. Bot. Beechey Voy. 251. 1841.
Poa amabilis L. Sp. Pl. 68. 1753.
Poa plumosa Retz. Obs. Bot. 4: 20. 1786.
Eragrostis plumosa Link, Hort. Berol. 1: 192. 1827.
In aspect similar to *E. ciliaris;* panicles open, oblong, 5 to 15 cm. long, the branches spreading, 1 to 2 cm. long; spikelets about as in *E. ciliaris*, the pedicels as long as the spikelet or longer.

Guatemala, Honduras, British Honduras, El Salvador, Costa Rica, Panama; open ground, fields, and waste places, at low altitudes. Warmer regions of both hemispheres, introduced in America. Type from India.

3. **Eragrostis viscosa** (Retz.) Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 1: 397. 1830.

Poa viscosa Retz. Obs. Bot. 4: 20. 1786.

Eragrostis tenella viscosa Stapf; Hook. f. Fl. Brit. Ind. 7: 315. 1896.

Similar to *E. amabilis;* plant usually more robust; panicle stiffer, the branches stiffly spreading or ascending, the axis and branches viscid, the spikelets somewhat larger.

Guatemala, El Salvador, Panama; open ground at low and medium altitudes. Southeastern Asia, introduced in America.

4. **Eragrostis maypurensis** (H. B. K.) Steud. Syn. Pl. Glum. 1: 276. 1854.

Poa maypurensis H. B. K. Nov. Gen. & Sp. 1: 161. 1816.

Poa vahlii Roem. & Schult. Syst. Veg. 2: 563. 1817.

Eragrostis vahlii Nees, Agrost. Bras. 499. 1829.

Eragrostis amoena Presl, Rel. Haenk. 1: 275. 1830.

Eragrostis panamensis Presl, Rel. Haenk. 1: 277. 1830.

Megastachya amoena Fourn. Mex. Pl. 2: 118. 1886.

Megastachya panamensis Fourn. Mex. Pl. 2: 118. 1886.

Culms erect from a spreading base, 10 to 30 cm. tall, the narrow blades mostly near the base; panicles brownish or yellowish, narrow, the short branches somewhat distant, stiffly ascending, spikelet-bearing from the base; spikelets linear, as much as 15 mm. long; lemmas about 2.5 mm. long, rather abruptly narrowed to an acuminate point.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; open ground, pastures, and waste places, at low altitudes. Mexico to Brazil and Bolivia. Type from Venezuela.

5. **Eragrostis simpliciflora** (Presl) Steud. Syn. Pl. Glum. 1: 278. 1854.

Megastachya simpliciflora Presl, Rel. Haenk. 1: 283. 1830.

Culms cespitose, spreading or prostrate, 10 to 40 cm. tall; panicles narrow, condensed, 2 to 10 cm. long, the branches spreading or ascending, fasciculately flowered to the base, glabrous in the axils, spikelets narrow, 1 to 3 cm. long, nearly sessile in groups of 2 to 4, 10 to 30 flowered; lemmas about 5 mm. long, gradually narrowed from below the middle to an acuminate point, the lateral nerves usually double, the lemma thus being 5-nerved.

Guatemala, El Salvador, Costa Rica, Panama; open ground and savannas, at low and medium altitudes, Pacific side. Mexico, whence the type, to Panama.

6. **Eragrostis hypnoides** (Lam.) B. S. P. Prel. Cat. N. Y. 69. 1888.

Poa hypnoides Lam. Tabl. Encycl. 1: 185. 1791.

Stoloniferous, forming mats, the flowering culms mostly 5 to 10 cm. tall; blades 1.5 to 2 cm. long, spreading; panicles small, more or less capitate, the pale, many-flowered spikelets commonly 1 cm. long.

Guatemala, El Salvador, Nicaragua, Costa Rica, Panama; banks of lakes and streams, margins of swamps and wet places, at low altitudes. United States to Brazil. Type from tropical America, the exact locality not known.

7. **Eragrostis cilianensis** (All.) Link; Vign. Lut. Malpighia 18: 386. 1904. STINKGRASS.

Poa cilianensis All. Fl. Pedem. 2: 246. 1785.

Eragrostis major Host, Icon. Gram. Austr. 4: 14 *pl. 24.* 1809.

Eragrostis megastachya Link, Hort. Berol. 1: 187. 1827.

Culms erect or spreading; panicles rather compact, 2 to 10 cm. long, greenish or whitish, the spikelets many-flowered, larger than in the other annual species; spikelets 5 to 15 mm. long, 3 mm. wide, 10 to 40 flowered, the florets closely imbricate; pedicels and keels of the acute glumes and lemmas sparingly glandular; lemmas thin, the lateral nerves prominent.

Guatemala, El Salvador, Nicaragua, Costa Rica; open ground, fields, and waste places, at low and medium altitudes. A common weed in temperate regions of both hemispheres, introduced in America.

8. **Eragrostis glomerata** (Walt.) L. H. Dewey, Contr. U. S. Nat. Herb. 2: 543. 1894.

Poa glomerata Walt. Fl. Carol. 80. 1788.

Poa conferta Ell. Bot. S. C. & Ga. 1: 158. 1816.

Eragrostis conferta Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 1: 409. 1830.

Robust annual, sometimes as much as 2 meters tall and appearing like a perennial, freely branching, the branches sometimes fascicled; blades elongate; panicles as much as 40 cm. long, narrowly contracted, densely flowered, the spikelets about 2 mm. long, 4 to 6 flowered, the lemmas scarcely 1 mm. long.

El Salvador; moist places, at low altitudes. Southeastern United States to Uruguay. Type from South Carolina.

9. **Eragrostis tephrosanthos** Schult. Mant. 2: 316. 1824.

Erect or spreading annual, pilose at the summit of the sheaths and in the axils of the lower panicle branches, otherwise glabrous; culms 20 to 30 cm. tall, sometimes taller; panicles oblong, open, loosely many-flowered, commonly one-third to half the entire height of the culm; spikelets 4 to 6 mm. long, about 1.5 mm. wide, 6 to 12 flowered; glumes about 1 and 1.3 mm. long; lemmas somewhat compressed, each overlapping the one above by one-third to half.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; open ground, fields and waste places, at low and medium altitudes. Southern United States, Mexico, and West Indies to Brazil. Type from Martinique.

ERAGROSTIS PILOSA (L.) Beauv., a common West Indian species, differs in having narrower spikelets on more slender pedicels, the glumes 0.5 and 1 mm. long, the lemmas nearly terete, each overlapping the one above by scarcely one-fifth.

10. **Eragrostis mexicana** (Lag.) Link, Hort. Berol. 1: 190. 1827.

Poa mexicana Lag. Gen. & Sp. Nov. 3. 1816.

Resembling larger forms of *E. tephrosanthos* but on the average larger, as much as 1 meter tall; panicles large, often drooping, gray or drab, 15 to 20 cm. long, the branches ascending, rather closely flowered, the lower axils pilose; spikelets linear-oblong, 5 to 7 mm. long, 8 to 12 flowered; glumes unequal, 1 and 1.5 mm. long; lemmas about 1.7 mm. long, 0.5 mm. wide.

Honduras, Costa Rica (Las Cóncavas); moist ground. Southwestern United States and Mexico, whence the type, to Chile.

11. **Eragrostis limbata** Fourn. Mex. Pl. 2: 116. 1886.

Erect or spreading cespitose annual, as much as 60 cm. tall; blades flat, panicles usually purplish, oblong, open, mostly erect, usually less than half the entire height of the culm, the branches rather stiffly spreading, glabrous in the axils, the branches of the second and third order also spreading; spikelets oblong, somewhat compressed, mostly 5 to 6 mm. long and 8 to 12 flowered; glumes nearly equal, 1.5 mm. long; lemmas 2 mm. long, acute.

Guatemala, Honduras, El Salvador, Costa Rica, Panama; fields, gardens, and waste places, at low and medium altitudes. Mexico, whence the type, to Bolivia.

12. Eragrostis lugens Nees, Agrost. Bras. 505. 1829.

Erect cespitose perennial, 30 to 50 cm. tall; sheaths more or less pilose; blades flat or involute; panicles rather diffuse, fragile, usually more than half the entire length of the culms, the axils somewhat pilose or the upper glabrous; spikelets little compressed, 5 to 10 flowered; lemmas convex on back, obscurely nerved, about 1.3 mm. long, acute.

Guatemala, Honduras, El Salvador, Costa Rica; dry hills, thickets, and grassland at medium altitudes. Southwestern United States and Mexico to Argentina. Type from Brazil.

13. Eragrostis acutiflora (H. B. K.) Nees, Agrost. Bras. 501. 1829.

Poa acutiflora H. B. K. Nov. Gen. & Sp. 1: 161. 1816.

Erect perennial, 30 to 60 cm. tall; blades flat, becoming loosely involute; panicles oblong, 10 to 20 cm. long, the branches somewhat distant, ascending, the spikelets about 5 mm. long, more or less appressed along the main branches; lemmas about 2 mm. long, acuminate, the tips not appressed.

British Honduras, Panama; ditches and wet savannas, at low altitudes. Central America to Brazil and Bolivia. Type from Colombia.

14. Eragrostis prolifera (Swartz) Steud. Syn. Pl. Glum. 1: 278. 1854.

Poa prolifera Swartz, Prodr. Veg. Ind. Occ. 27. 1788.

Eragrostis gigantea Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 1: 403. 1830.

Eragrostis excelsa Griseb. Cat. Pl. Cub. 227. 1866.

Culms often in large clumps, erect, sometimes stoloniferous, commonly robust, about 1 meter tall, sometimes taller, the branches often fascicled; blades elongate, involute towards the ends; panicles large, open, or somewhat contracted, the spikelets pale, usually many-flowered; florets not closely imbricate, the rachilla exposed, the lemmas 1.5 mm. long, acutish.

Guatemala, El Salvador, Nicaragua, Costa Rica, Panama; sandy beaches and brackish marshes along the coast, Pacific side. Central America and the West Indies to Brazil. Type from Guadeloupe.

15. Eragrostis secundiflora Presl, Rel. Haenk. 1: 276. 1830.

Poa oxylepis Torr. in Marcy, Expl. Red Riv. 301. *pl. 19.* 1853.

Eragrostis oxylepis Torr. U. S. Rep. Expl. Miss. Pacif. 4: 156. 1857.

Erect perennial, 30 to 60 cm. tall; panicles narrow, usually purplish, the branches ascending, compactly flowered, the panicle sometimes interruptedly spikelike; spikelets oblong-ovate, rather turgid, the florets closely imbricate; lemmas 2 mm. long, 1 mm. wide, acute or acuminate, the tip not closely appressed.

Costa Rica (San Francisco de Guadelupe); sandy soil. Southwestern United States and Mexico, whence the type, to Costa Rica.

13. UNIOLA L. Sp. Pl. 71. 1753

Spikelets 3 to many flowered, the lower 1 to 4 lemmas empty, the rachilla disarticulating above the glumes and between the florets; glumes compressed-keeled, rigid, usually narrow, nerved, acute or acuminate or rarely mucronate; lemmas compressed, sometimes conspicuously flattened, chartaceous, many-nerved, the nerves sometimes obscure, acute or acuminate, the empty ones at the base usually successively smaller, the uppermost usually reduced; palea rigid, sometimes bowed out in the winged keels. Rather tall, erect perennials, with flat or convolute blades and narrow or open panicles of compressed spikelets. Species nine, North America, one in the Andes.

1. **Uniola pittieri** Hack. Oesterr. Bot. Zeitschr. **52**: 309. 1902.

Stout, glabrous, extensively stoloniferous perennial; blades elongate; panicles 10 to 30 cm. long, contracted; spikelets very flat, 1 to 2 cm. long, about 1 cm. wide.

Guatemala, Costa Rica (type from Salinas Bay), Panama; sandy sea beaches. Mexico to Ecuador.

14. ARUNDO L. Sp. Pl. 81. 1753

Spikelets several-flowered, the florets successively smaller, the summits of all about equal, the rachilla glabrous, disarticulating above the glumes and between the florets; glumes somewhat unequal, membranaceous, 3-nerved, narrow, tapering into a slender point, about as long as the spikelet; lemmas thin, 3-nerved, densely long-pilose, gradually narrowed at the summit, the nerves ending in slender teeth, the middle one longer, extending into a straight awn. Tall perennial reeds, with broad linear blades and large plumelike terminal panicles. Species about six, in the warmer parts of the Old World, one introduced in America.

1. **Arundo donax** L. Sp. Pl. 81. 1753. CARRIZO.

Tall reed with strong sparingly branching culms; blades flat, elongate, scabrous-margined; panicles 30 to 60 cm. long, densely flowered, the spikelets about 1 cm. long.

El Salvador; introduced along ditches, also cultivated for ornament. Becoming common in the warmer parts of America especially in irrigated regions. Giant reed.

15. PHRAGMITES Adans. Fam. Pl. 2: 34, 559. 1763

Spikelets several-flowered, the rachilla clothed with long silky hairs, disarticulating above the glumes and at the base of each joint between the florets, the lowest floret staminate or neuter; glumes 3-nerved, or the upper 5-nerved, lanceolate, acute, unequal, the first about half as long as the second, the latter shorter than the florets; lemmas narrow, long-acuminate, glabrous, 3-nerved, the florets successively smaller, the summits of all about equal; palea much shorter than the lemma. Perennial reeds, with broad, flat linear blades and large terminal panicles. Species three, one in Asia, one in Argentina, and one cosmopolitan.

1. **Phragmites communis** Trin. Fund. Agrost. 134. 1820. REED.

Arundo phragmites L. Sp. Pl. 81. 1753.

Arundo vulgaris Lam. Fl. Franç. 3: 615. 1778. Published as an avowed equivalent of *A. phragmites*, hence a synonym.

Phragmites vulgaris Crép. Man. Fl. Belg. ed. 2. 345. 1866.

Phragmites phragmites Karst. Deutsch. Fl. 379. 1880.

A tall reed, usually growing in colonies, in aspect like *Arundo donax*, stoloniferous, the panicle more open and drooping.

Honduras, El Salvador, Costa Rica, Panama; marshes and wet places, throughout the temperate regions of the world, extending into the Tropics. Type from Europe.

16. CORTADERIA Stapf. Gard. Chron. III. 22: 378, 396. 1897

Spikelets several-flowered, the rachilla disarticulating near the base of the internodes, the lower shorter part glabrous, the upper longer part bearded, forming a stipe to the floret; florets clothed with long hairs; glumes longer than

the first floret (excluding awn), sometimes longer than all the florets; lemma tapering into a slender point or awn, or awned from between the slender teeth of a bifid apex. Mostly large tussock grasses, the leaves generally crowded at the base, the blades long and narrow, tapering to a slender point, usually very rough on the margins; inflorescence a panicle, sometimes large and plumelike. Species about 10, Costa Rica to Argentina and Chile, in the mountains.

1. Cortaderia nitida (H. B. K.) Pilger, Bot. Jahrb. Engler 37: 374. 1906.

Arundo nitida H. B. K. Nov. Gen. & Sp. 1: 149, *pl. 688*. 1816.

Gynerium columbianum Pilger, Bot. Jahrb. Engler 27: 31. 1899.

Culms mostly 1 to 1.5 meters tall; old sheaths becoming flattened and coiled at the base of the plant; blades very scabrous, becoming loosely involute, about 5 mm. wide; panicles rather loose, mostly 10 to 20 cm. long, tawny or purplish.

Costa Rica, Panama (Chiriquí Volcano); ravines and bogs at high altitudes. Costa Rica to Peru. Type from Colombia.

17. GYNERIUM Willd.; Beauv. Ess. Agrost. 138. *pl. 24. f. 6.* 1812

Plants dioecious; spikelets several-flowered; pistillate spikelets with long-attenuate glumes and smaller long-silky lemmas; staminate spikelets with shorter glumes and glabrous lemmas. Species one, tropical America.

1. Gynerium sagittatum (Aubl.) Beauv. Ess. Agrost. 138. *pl. 24. f. 6.* 1812.

Saccharum sagittatum Aubl. Pl. Guian. 1: 50. 1775.

Gynerium saccharoides Humb. & Bonpl. Pl. Aequin. 2: 105. *pl. 115.* 1813.

Arundo saccharoides Poir. in Lam. Encycl. Suppl. 4: 703. 1816.

Stout reeds often 10 meters tall, the culms clothed below with old sheaths, the blades having fallen; blades sharply serrulate, commonly 2 meters long and 4 to 6 cm. wide (forming a great fan-shaped summit to the sterile culms); panicles pale, plumy, densely flowered, 1 meter or more long, the main axis erect, the branches drooping; pistillate panicles silky from the villous florets; staminate panicles glabrous.

El Salvador, Nicaragua, Costa Rica, Panama; river banks and low ground, forming dense colonies, at low altitudes. Southern Mexico and the West Indies to Paraguay. Type from French Guiana. The canes are used for lattice work, laths, and in light construction for buildings. Called Vara de Castilla, Caña de Castilla.

18. DACTYLIS L. Sp. Pl. 71. 1753

Spikelets few-flowered, compressed, finally disarticulating between the florets, nearly sessile in dense 1-sided fascicles, these borne at the ends of the few branches of a panicle; glumes unequal, carinate, acute, hispid-ciliate on the keel; lemmas compressed-keeled, mucronate, 5-nerved, ciliate on the keel. Perennials, with flat blades and fascicled spikelets. Species two or three, in Eurasia.

1. Dactylis glomerata L. Sp. Pl. 71. 1753. ORCHARD GRASS.

Rather coarse roughish perennial commonly about 1 meter tall; blades flat; panicles of few to several branches naked at base, bearing toward the ends clusters of densely crowded, sparsely pilose spikelets 0.8 to 1 cm. long.

Costa Rica (north of El Copey, altitude 2,200 meters). Commonly cultivated in temperate parts of America for forage, escaped from cultivation.

19. LAMARCKIA Moench, Meth. Pl. 201. 1794

Spikelets of two kinds, in fascicles, the terminal one of each fascicle fertile, the others sterile; fertile spikelet, with 1 perfect floret, the rachilla produced beyond the floret, bearing a small awned empty lemma or reduced to an awn;

glumes narrow, acuminate or short-awned, 1-nerved; lemma broader, raised on a slender stipe, scarcely nerved, bearing just below the apex a delicate straight awn; sterile spikelets linear, 1 to 3 in each fascicle, consisting of 2 glumes similar to those of the fertile spikelet, and numerous distichously imbricate, obtuse, awnless, empty lemmas. A low, erect annual, with flat blades and oblong, 1-sided, compact panticles, the crowded fascicles drooping, falling entire, the fertile hidden, except the awns, by the numerous sterile ones. Species one, a native of southern Europe.

1. **Lamarckia aurea** (L.) Moench, Meth. Pl. 201. 1794. GOLDENTOP GRASS.
   Cynosurus aureus L. Sp. Pl. 73. 1753.
   Achyrodes aureum Kuntze, Rev. Gen. Pl. 2: 758. 1891.

Culms erect, or decumbent at base, 10 to 40 cm. tall; leaves smooth; panicle dense, 2 to 7 cm. long, 1 to 2 cm. wide, shining, golden-yellow or purplish, the branches close, short, erect; pedicels fascicled, somewhat clavate, pubescent, spreading at right angles or drooping, the fascicles with a tuft of long whitish hairs at the base; fertile spikelet about 2 mm. long, the sterile 6 to 8 mm. long; glumes of both hyaline.

Guatemala, (Guatemala City). A native of Mediterranean regions, naturalized in California, parts of Mexico and Central America.

20. STREPTOGYNE Beauv. Ess. Agrost. 80. *pl. 16. f. 8.* 1812

Spikelets several-flowered, subsessile in a long 1-sided raceme; glumes unequal, much shorter than the elongate terete callus-tipped florets; lemmas firm, tapering into a slender awn; palea about as long as the lemma; stigmas 3, elongate, persistent, coiled, the mature fruits hanging by these entangled stigmas. A single species.

1. **Streptogyne crinita** Beauv. Ess. Agrost. 80. *pl. 16. f. 8.* 1812.

Erect perennial, 1 to 1.5 meters tall, with elongate leaves mostly aggregate at the base and reaching beyond the base of the inflorescence; blades 1 to 1.5 cm. wide; spike slender, 30 to 50 cm. long, the axis rather firm, the short-pediceled slender spikelets appressed, about 3 cm. long, excluding the slender awns and curled stigmas.

Costa Rica; Panama; wet forest at low altitudes. Mexico and Trinidad to Brazil. Type from Guiana.

21. ORTHOCLADA Beauv. Ess. Agrost. 69. *pl. 14. f. 9.* 1812

Spikelets articulated below the glumes, 1-flowered with a prolongation of the rachilla, or 2-flowered, the florets distant; glumes and lemmas acuminate. A broad-leaved perennial with diffuse panicle. A single species.

1. **Orthoclada laxa** (L. Rich.) Beauv. Ess. Agrost. 70, 149, 168. 1812.
   Aira laxa L. Rich. Act. Soc. Hist. Nat. Paris 1: 106. 1792.
   Panicum rariflorum Lam. Encycl. 4: 746. 1798.
   Orthoclada rariflora Beauv. Ess. Agrost. 70. *pl. 14. f. 9.* 1812.

Stoloniferous perennial; flowering culms ascending, leafy, simple, commonly 1 meter long; blades slender-petioled, lanceolate, mostly 12 to 15 cm. long, about 2.5 cm. wide; panicle large, as broad as long, the long, slender, naked branches and capillary branchlets at first erect, finally stiffly divergent, bearing 1 to few spikelets at the extremities; glumes narrow, acute, 4 and 5 mm. long; lemmas 6 to 7 mm. long, acuminate or short-awned.

Guatemala, Honduras, Costa Rica, Panama; moist forests, at low altitudes. Mexico to Brazil and Peru. Type from Guiana.

22. ZEUGITES P. Br. Civ. Nat. Hist. Jam. ed. 2. 341 and Index II. 1789

(*Senites* Adans. Fam. Pl. 2: 39, 604. 1763. Ineffectively published)

Spikelets few to several-flowered, the lowest floret perfect, the others staminate, the rachilla joint between the perfect and staminate florets elongate; glumes and fertile lemma herbaceous, broad, with transverse veins between the nerves, obtuse or truncate, the glumes about half as long as the lemma; sterile lemmas membranaceous, narrower, acute. Broad-leaved perennials, with terminal panicles. Species about 6, tropical America.

Blades oblong-lanceolate, more than 15 cm. long----------1. Z. pittieri.
Blades ovate or ovate-lanceolate, less than 5 cm. long.
  Glumes 3 to 4 mm. long, widened above----------2. Z. munroana
  Glumes about 2 mm. long, narrow----------3. Z. mexicana.

1. Zeugites pittieri Hack. Oesterr. Bot. Zeitschr. 52: 373. 1902.

Culms erect, robust, 1 to 2 meters tall; blades oblong-lanceolate; smooth and glabrous on the upper surface, appressed-hispidulous beneath, rounded or slightly cordate at base, short-petiolate, acuminate, 15 to 25 cm. long, 4 to 7 cm. wide; panicle open, 20 to 30 cm. long, nearly as wide the branches ascending, floriferous from near the base, the spikelets on branches of third or fourth order, the lateral pedicels shorter than the spikelets; spikelets compressed, rather soft, oblong, 1 to 2 cm. long, about 5 mm. wide (in dried specimens), the staminate florets 10 to 12; glumes obtuse, broad above, the apex ciliolate, entire, the first about 5 mm. long, the second a little shorter; sterile lemmas acute, about 4 mm. long.

Costa Rica; forests, 500 to 1,100 meters. Known only from Costa Rica, the type from Alto del Rodeo.

2. Zeugites munroana Hemsl. Biol. Centr. Amer. Bot. 3: 577. 1885.
Zeugites hartwegi Fourn. Mex. Pl. 2: 121. 1886.
Senites hartwegi Arthur, Torreya 19: 48. 1919.

Spreading branching perennial; culms slender, 20 to 40 cm. long; blades glabrous, ovate-lanceolate, 1.5 to 3 cm. long, 5 to 10 mm. wide, rounded at base, the slender petiole as much as 1 cm. long; panicles ovoid, 2 to 4 cm. long, open, the branches 1 to 4 flowered; spikelets, 7 to 8 mm. long, with one fertile and one or two sterile florets; glumes about 4 mm. long, broad, reticulate-veined, the obtuse summit ciliate and more or less notched; fertile lemma similar, sometimes short-awned; staminate florets about 5 mm. long.

Guatemala; shady banks, 2,500 to 3,000 meters. Mexico, whence the type, and Guatemala.

3. Zeugites mexicana (Kunth) Trin.; Steud. Nom. Bot. ed. 2. 2: 798. 1841.
Despretzia mexicana Kunth, Rév. Gram. 2: 485. *pl.* 157, 1831.
Senites mexicana Hitchc. Contr. U. S. Nat. Herb. 17: 370. 1913.

In aspect similar to *Z. munroana;* blades ovate, 1.5 to 3 cm. long, as much as 1.5 cm. wide; panicles few-flowered, the spikelets awnless, on slender pedicels, 5 to 6 mm. long; glumes about 2 mm. long; staminate florets one or two, about 3 mm. long.

Guatemala, Costa Rica, Panama; rich shady places, 1,000 to 2,000 meters. Mexico, whence the type, to Bolivia.

23. TRITICUM L. Sp. Pl. 85. 1753

Spikelets 2 to 5 flowered, solitary, sessile, placed flatwise at each joint of a continuous or articulate rachis, the rachilla disarticulating above the glumes and between the florets or continuous; glumes rigid, 3 to several nerved, the

apex abruptly mucronate or toothed or with one to many awns. Annuals, with flat blades and terminal spikes. Species about 10, southern Europe and western Asia. One species, *T. vulgare*, cultivated in all temperate regions.

1. Triticum aestivum L. Sp. Pl. 85. 1753. WHEAT.

Triticum sativum Lam. Fl. Franç. 3: 625. 1778.

Triticum vulgare Vill. Hist. Pl. Dauph. 2: 153. 1787.

Common wheat is cultivated at temperate altitudes in Guatemala and occasionally in other parts of Central America. There are a large number of varieties differing in the length of the awn (bearded and beardless varieties) and in the pubescence of the spikelets (pubescent forms called velvet-chaff varieties).

24. LOLIUM L. Sp. Pl. 83. 1753

Spikelets several-flowered, solitary and sessile, placed edgewise to the continuous rachis, one edge fitting to the alternate concavities, the rachilla disarticulating above the glumes and between the florets; first glume wanting (except on the terminal spikelet), the second outward, strongly 3 to 5 nerved, equaling or exceeding the second floret; lemmas rounded on the back, 5 to 7 nerved, obtuse, acute, or awned. Annuals or perennials, with flat blades and simple terminal flat spikes. Species about eight, in Eurasia, four of these being introduced in America.

1. Lolium perenne L. Sp. Pl. 83. 1753. PERENNIAL RYEGRASS.

Erect or spreading, tufted perennial, 20 to 40 cm. tall; blades flat; spikes slender, 5 to 15 cm. long; lemmas awnless.

Costa Rica; pastures at upper altitudes. A European species cultivated for forage in cool moist climates, introduced in America.

25. JOUVEA Fourn. Bull. Soc. Bot. Belg. 15: 475. 1877

Spikelets unisexual, the plants dioecious; staminate spikelets many-flowered, sessile, somewhat distant on opposite sides of the rachis, forming a terminal spike, the florets closely imbricate; glumes 2, shorter than the first floret; lemmas 3-nerved, awnless; pistillate spikelets in the axils of the leaves, single or in fascicles of 3 or 4, terete somewhat curved, acuminate, consisting of 1 to 3 florets imbedded in the spongy tissue of the rachilla, only the summit of the floret free, this consisting of a free end of a lemma folded around the style; style and base of stigma elongate, 2-lobed.

The floret appears to possess but one bract, this presumably a lemma, all except the tip fused with the spongy tissue of the rachilla. However, that which is called a spikelet may be a spike with 1 to 3 spikelets imbedded. Morphological research is needed here.

Plants slender, the runners about 1 mm. in diameter; pistillate spikelets single in the axils of the leaves ..... 1. *J. straminea*.

Plants rather stout, the runners about 2 mm. in diameter; pistillate spikelets in fascicles ..... 2. *J. pilosa*.

1. Jouvea straminea Fourn. Bull. Soc. Bot. Belg. 15: 475. 1876.

Slender, cespitose, 30 to 50 cm. tall, with long runners or stolons; blades flat, glabrous, 2 to 5 cm. long, 1 to 2 mm. wide, the sheaths a little pilose at the throat; pistillate spikelets single in the axils of the leaves, 2 to 3 cm. long, slender, slightly curved, about 1 mm. thick; staminate spikelets 1 to 1.5 cm. long.

El Salvador (La Unión), Panama (Bella Vista); muddy seacoast shores or marshes. Mexico, whence the type, to Panama.

2. **Jouvea pilosa** (Presl) Scribn. Bull. Torrey Club **23**: 143. 1896.

Brizopyrum pilosum Presl, Rel. Haenk. 1: 280. 1830.

Rhachidospermum mexicanum Vasey, Bot. Gaz. **15**: 110. *pl. 12*. 1890.

Cespitose, with stout runners or stolons about 2 mm. thick; culms 20 to 40 cm. tall; blades flat becoming involute, glabrous, scabrous on the margins, 1 to 4 mm. wide, the sheaths pilose at the throat; pistillate spikelets 2 to 4 cm. long, 2 to 3 mm. thick, fascicled in the axils of the leaves, the fascicles approximate, each spikelet with a bract and a prominent prophyllum; caryopsis 7 mm. long; style from one side of the summit of the caryopsis, glabrous, 3 mm. long; stigma (or pubescent summit of style) entire for 4 mm. then bilobed for about 1 cm.; staminate spikelets as much as 5 cm. long.

Guatemala, El Salvador, Nicaragua; sandy sea beaches. Mexico, whence the type, to Nicaragua.

26. PARIANA Aubl. Pl. Guian. 2: 876. *pl. 337*. 1775

Spikelets in opposite clusters of 3 at each joint of a readily disarticulating rachis, forming a spike, the central spikelet of the cluster pistillate, the other 2 staminate; stamens numerous. Perennials with broad blades. Species about 12, tropical America.

1. **Pariana zingiberina** Doell in Mart. Fl. Bras. **2**: 337. 1877.

Erect broad-leaved perennial, with the aspect of ginger, with one vegetative and one fertile culm, the vegetative culm 50 to 80 cm. tall, naked below, bearing several oblong-elliptic blades 12 to 15 cm. long, 3 to 5 cm. wide, the lower 1 or 2 smaller, the summit of the sheaths naked or with a few stiff bristles; fertile culm naked, shorter than the sterile one, bearing a single terminal dense spike 5 to 8 cm. long, somewhat resembling beardless wheat.

Costa Rica (Prov. Limón, 55 meters); Panama (Nómbre de Diós), wet forest at low altitudes. Costa Rica to Brazil, whence the type.

27. TRISETUM Pers. Syn. Pl. 1: 97. 1805

Spikelets usually 2-flowered, sometimes 3 to 5 flowered, the rachilla prolonged behind the upper floret, usually villous; glumes somewhat unequal, acute, the second usually longer than the first floret; lemmas usually short-bearded at the base, 2-toothed at the apex, the teeth often awned, bearing from the back below the cleft apex a straight and included, or usually bent and exserted, awn (awn obsolete or nearly so in one species). Tufted perennials with flat blades and open or usually contracted or spikelike panicles. Species about 65, in the arctic and temperate regions of both hemispheres.

Lemmas awnless or nearly so, pubescent ..... **4. T. pringlei.**

Lemmas awned from the back.

Lemmas scabrous ..... **1. T. irazuense.**

Lemmas glabrous.

Panicle narrow, rather compact ..... **2. T. deyeuxioides.**

Panicle open, the branches spreading ..... **3. T. viride.**

1. **Trisetum irazuense** (Kuntze) Hitchc. Proc. Biol. Soc. Washington **40**: 82. 1927.

Calamagrostis irazuensis Kuntze, Rev. Gen. Pl. **2**: 763. 1891.

Trisetum scabriflorum Hitchc. Contr. U. S. Nat. Herb. **24**: 358. 1927.

Culms lax, more or less decumbent or spreading; glabrous, 60 to 120 cm. tall; sheaths pubescent or the upper ones glabrous; blades flat, sparsely pilose on both surfaces, mostly 2 to 3 mm. wide; panicle narrow, somewhat loose and interrupted, nodding, greenish or purplish, 15 to 20 cm. long, the branches

ascending, rather lax, some of them floriferous to base, the longer as much as 5 cm. long; spikelets 2 or 3 flowered, 5 to 8 mm. long, the florets extending above the glumes, the rachilla joints long-pilose, 1 to 2 mm. long; glumes scabrous on the keels, mostly on the upper half, or toward the apex only, the first rather narrow, acuminate, 1-nerved, 4 to 5 mm. long, the second broader and rather abruptly acuminate, 3-nerved, 5 to 6 mm. long; lemmas compressed, lanceolate, slightly toothed, obscurely 5-nerved, scabrous all over the back and somewhat wrinkled or roughened, the lower 5 to 6 mm. long, the others a little shorter, the callus hairs about 0.5 mm. long; awn inserted one-third below the apex, loosely twisted and flexuous for about 2 mm., the terminal part spreading, 5 to 7 mm. long; palea a little shorter than the lemma.

Costa Rica (type from Irazú); Panama; pastures and páramos, 2,000 to 3,300 meters. Costa Rica to Ecuador.

2. Trisetum deyeuxioides (H. B. K.) Kunth, Rév. Gram. 1: 102. 1829.

Avena deyeuxioides H. B. K. Nov. Gen. & Sp. 1: 147. 1816.

Lax, erect or decumbent, about 1 meter tall; sheaths glabrous; blades flat, 2 to 6 mm. wide; panicles narrow, rather loose or interrupted, nodding, soft, 10 to 25 cm. long; glumes narrow, about equal, 4 to 6 mm. long; lemmas narrow, nearly terete, glabrous, 3 to 6 mm. long, the geniculate, twisted exserted awn attached about the middle; rachilla hairs abundant.

Guatemala; Panama (El Boquete); grassy banks and thickets, 700 to 2,000 meters. Mexico, whence the type, to Ecuador.

2a. Trisetum deyeuxioides pubescens Scribn.; Beal, Grasses N. Amer. 2: 374. 1896.

Deyeuxia evoluta Fourn. Bull. Soc. Bot. France 24: 181. 1877.

Trisetum evolutum Hitchc. Contr. U. S. Nat. Herb. 17: 325. 1913.

Differing from the species in having pubescent sheaths.

Guatemala (San Rafael; Antigua); El Salvador (Volcán de San Salvador); habitat of the species. Mexico, whence the type, and Central America.

3. Trisetum viride (H. B. K.) Kunth, Rév. Gram. 1: 101. 1829.

Avena viridis H. B. K. Nov. Gen. & Sp. 1: 147. 1816.

Tufted, with creeping rhizomes; culms 30 to 50 cm. tall; blades mostly basal, flat, or loosely involute, narrowed to a fine point, 10 to 15 cm. long; panicles ovoid, open, 5 to 15 cm. long, the branches spreading, slender, the lower in whorls, naked below, as much as 8 cm. long; glumes equal, rather narrow, acuminate, 4 to 5 mm. long; lower lemma about as long as the glumes, rather plainly 5-nerved, the callus hairs copious, nearly 2 mm. long, the coiled and geniculate, exserted awn attached above the middle; rachilla long-pilose.

Costa Rica; meadows and paramos, at high altitudes (above 2,000 meters). Mexico, whence the type, and Costa Rica.

4. Trisetum pringlei (Scribn.) Hitchc. Proc. Biol. Soc. Washington 40: 82. 1927.

Graphephorum pringlei Scribn.; Beal, Grasses N. Amer. 2: 561. 1896.

Densely cespitose; culms erect, glabrous, 20 to 35 cm. tall; sheaths densely and finely pubescent, especially those of the innovations, those of the culm glabrous or pubescent only toward the summit, ciliate; blades loosely involute, those of the innovations pubescent like the sheaths, those of the culm slightly pubescent, all erect, rather firm, about 0.5 mm. thick when rolled; panicles narrow but loose, lax, somewhat nodding, 6 to 10 cm. long, the branches ascending, slender, flexuous, some naked below, some floriferous from near the base; spikelets about 5 mm. long, narrow, 2-flowered (the upper floret readily deciduous); glumes glabrous, 2 and 3 mm. long; lemmas not much compressed,

the first about 3.5 mm. long, densely pubescent, especially on the lower half, the apex somewhat toothed, the midnerve sometimes extended as a minute awn, somewhat pilose on the callus, 5-nerved, the nerves obscured by the pubescence, the rachilla joint pilose, the hairs short below, increasing in length toward the summit, there as much as 1 mm. long, the second lemma similar but smaller, the rachilla prolonged behind the palea as a pilose bristle more than half the length of the floret.

Costa Rica (Cerro de las Vueltas); Panama (Chiriquí Volcano); paramos at high altitudes. Mexico, whence the type, to Panama.

This is an anomalous species of *Trisetum*, with the aspect of a species of *Poa*, and appears to be allied to *T. wolfii* Vasey of the western United States, the lemmas, as in that, being awnless or with a minute awn from the summit instead of from the back.

28. AVENA L. Sp. Pl. 79. 1753. Oat

Spikelets 2 to several-flowered, the rachilla bearded, disarticulating above the glumes and between the florets; glumes about equal, membranaceous or papery, several-nerved, longer than the lower floret, usually exceeding the upper floret; lemmas indurate, except toward the summit, 5 to 9 nerved, bidentate at the apex, bearing a dorsal bent and twisted awn (this straight and reduced in *Avena sativa*). Annuals or perennials, with narrow or open, usually rather few-flowered, panicles of usually large spikelets. Species about 55, in the temperate regions.

1. Avena sterilis L. Sp. Pl. ed. 2. 118. 1762. Animated oat.

Annual, as much as 1 meter tall, with flat blades and open few-flowered panicles; glumes about 3 cm. long; lemmas hirsute with long brown hairs, the awn twisted and geniculate, 3 to 5 cm. long.

Costa Rica (San José). A European species introduced here and there in America.

The cultivated oat, Avena sativa L., has glabrous florets; awn shorter than in *A. sterilis*, often much reduced and straight.

29. HOLCUS L. Sp. Pl. 1047. 1753

(*Notholcus* Nash; Hitchc. in Jepson, Fl. Calif. 1: 126. 1912)

Spikelets 2-flowered, the pedicel disarticulating below the glumes, the rachilla curved and somewhat elongate below the first floret, not prolonged above the second floret; glumes about equal, longer than the two florets; first floret perfect, its lemma awnless; second floret staminate, its lemma awned on the back. Perennials with flat blades and contracted panicles. Species about eight, Europe and Africa.

1. Holcus lanatus L. Sp. Pl. 1048. 1753. Velvet grass.

Notholcus lanatus Nash; Hitchc. in Jepson, Fl. Calif. 1: 126. 1912.

Perennial, 0.5 to 1 meter tall, grayish-velvety throughout, the pale, rather densely flowered narrow panicle usually 8 to 10 cm. long; glumes about 4 mm. long; first floret 2 mm. long, the second smaller, with a hooklike awn.

Costa Rica; pastures, 1,400 to 2,600 meters. Native of Europe, introduced in America.

30. CALAMAGROSTIS Adans.; Roth, Tent. Fl. Germ. 1: 33. 1788

Spikelets 1-flowered, the rachilla disarticulating above the glumes, usually prolonged behind the palea as a short, commonly hairy bristle; glumes about equal, acute or acuminate; lemma shorter and usually more delicate than the

glumes, the callus bearing a tuft of hairs which are often copious and as long as the lemma, awned from the back, usually below the middle, the awn delicate and straight, or stouter and exserted, bent and sometimes twisted; palea shorter than the lemma. Perennials with small spikelets in open or usually narrow, sometimes spikelike panicles. Species over 100, in the cool and temperate regions of both hemispheres.

Callus hairs short (less than 0.5 mm. long).

Culms erect from a compact base; blades involute_____1. C. intermedia.

Culms decumbent, rather loose at base; blades flat, becoming involute.

2. C. pittieri.

Callus hairs more than 1 mm. long.

Culms creeping at base; blades flat, becoming involute___3. C. guatemalensis.

Culms erect, cespitose; blades hard, closely involute_____4. C. junciformis.

1. **Calamagrostis intermedia** (Presl) Steud. Nom. Bot. ed. 2. 1: 250. 1840.

Deyeuxia stricta H. B. K. Nov. Gen. & Sp. 1: 146. 1816. Not *Calamagrostis stricta* Koel. 1802.

Deyeuxia intermedia Presl, Rel. Haenk. 1: 249. 1830.

Calamagrostis humboldtiana Steud. Nom. Bot. ed. 2. 1: 250. 1840.

Erect, pale, cespitose, culms 30 to 100 cm. tall; blades erect, scabrous, involute; panicles narrow, rather loose, 15 to 35 cm. long; glumes about 6 mm. long; lemma 5 mm. long, scaberulous, toothed, the callus hairs short; awn bent and exserted; rachilla 2.5 to 3 mm. long, pilose with rather short hairs.

Costa Rica (Cerro de Buena Vista, 3,100 meters); moist paramos. Costa Rica to Argentina. Type from Colombia.

2. **Calamagrostis pittieri** Hack. Oesterr. Bot. Zeitschr. 52: 108. 1902.

Culms erect or decumbent at base, rather loosely cespitose, 30 to 50 cm. tall; sheaths, at least the lower, puberulous; blades rather short and clustered at the base of the plant, flat or loosely involute, pilose on the upper surface; panicles narrow, rather loose, 10 to 20 cm. long, the branches ascending, some of the lower naked at base; glumes narrow, acuminate, about 5 mm. long; lemma a little shorter than the glumes, the callus hairs short, the awn attached just above the middle of the back, geniculate, twisted below, the terminal segment horizontal, 5 mm. long; rachilla 2 mm. long, strongly pilose with hairs 3 mm. long.

Costa Rica (Cerro de Buena Vista, 3,100 meters, the type; Cerro de la Muerte, 3,100 meters).

3. **Calamagrostis guatemalensis** Hitchc. Proc. Biol. Soc. Washington. 40: 82. 1927.

Culms erect from a creeping base, 30 to 60 cm. tall; sheaths glabrous or slightly scaberulous; blades numerous on lower part of plant, firm, flat, becoming involute, 1 to 3 mm. wide, scabrous on both surfaces; panicles narrow, condensed, sometimes interruptedly spikelike, 7 to 12 cm. long, purplish or brownish, the branches ascending or appressed, as much as 3 cm. long floriferous nearly to the base; glumes equal, acute, scaberulous, 4 to 5 mm. long; lemma minutely scaberulous, 4 mm. long, the narrow apex with 4 fine teeth, the callus hairs about half as long as the lemma; awn attached less than 1 mm. above base, the twisted straight part nearly as long as the lemma, the terminal part bent sharply to one side, 3 to 6 mm. long; rachilla a little more than 1 mm. long, clothed with hairs about 2 mm. long.

Guatemala (Volcán de Agua, the type, and Volcano Atitlán); 2,700 to 3,100 meters, in humus.

4. Calamagrostis junciformis (H. B. K.) Steud. Nom. Bot. ed. 2. 1: 250. 1840.
Deyeuxia junciformis H. B. K. Nov. Gen. & Sp. 1: 143. 1816.

Erect, densely cespitose; culms 20 to 40 cm. tall, with smooth shiny sheaths, firm, involute nearly glabrous blades, 20 to 30 cm. long and 1 to 1.5 mm. thick; panicles loose, 10 to 15 cm. long, the slender branches spreading; glumes about 6 mm. long, rather wide; lemma about as long as the glumes, puberulous toward the tip, the callus hairs about one-third as long as the lemma, the awn attached about the middle, geniculate, twisted and hispidulous below, the terminal segment horizontal, about 5 mm. long; rachilla 1.5 mm. long, the hairs 1 to 2 mm. long.

Guatemala (Volcán Tajumulco, 4,100 meters; Volcán de Agua, 2,300 meters); paramos. Mexico, whence the type, and Guatemala.

31. AGROSTIS L. Sp. Pl. 61. 1753. Bentgrass

Spikelets 1-flowered, disarticulating above the glumes, the rachilla usually not prolonged; glumes equal or nearly so, acute, acuminate, or sometimes awn-pointed, carinate, usually scabrous on the keel and sometimes on the back; lemma obtuse, usually shorter and thinner in texture than the glumes, awnless or dorsally awned, often hairy on the callus; palea usually shorter than the lemma, 2-nerved in only a few species, usually small and nerveless or obsolete. Perennials, rarely annuals, with open or contracted panicles of small spikelets. Species about 100, in temperature and cold regions, especially in the Northern Hemisphere.

Rachilla prolonged behind the palea as a bristle ..... 1. A. bacillata.
Rachilla not prolonged.
  Palea present.
    Lemma awned ..... 2. A. pittieri.
    Lemma awnless.
      Panicle somewhat open and spreading ..... 3. A. stolonifera.
      Panicle dense, more or less lobed or interrupted ..... 4. A. verticillata.
  Palea wanting.
    Panicle open, the branches spreading. Spikelets awnless; blades flat.
      Spikelets about 3 mm. long; lower panicle branches as much as 10 cm. long ..... 5. A. perennans.
      Spikelets about 2 mm. long; lower panicle branches not more than 5 cm. long ..... 6. A. turrialbae.
    Panicle narrow, the branches ascending or appressed.
      Spikelets about 3 mm. long, mostly purple; lemma 2 mm. long; panicle rather loose ..... 7. A. hoffmanni.
      Spikelets about 2 mm. long, mostly green; lemma 1.5 mm. long; panicles condensed, more or less interrupted ..... 8. A. tolucensis.

1. Agrostis bacillata Hack. Oesterr. Bot. Zeitschr. 52: 59. 1902.

Culms erect, cespitose, 25 to 40 cm. tall; leaves soft, mostly basal, blades blades; panicles ovoid, open, 5 to 8 cm. long; glumes about 2 mm. long; lemma and palea about equal, a little shorter than the glumes; rachilla prolonged as a glabrous bristle about two-thirds as long as the palea.

Costa Rica (Cerro de la Muerte, 3,100 meters, the type; Cerro de las Vueltas, 2,700 to 3,000 meters); paramos.

2. Agrostis pittieri Hack. Oesterr. Bot. Zeitschr. 52: 60. 1902.

Culms erect, cespitose, 25 to 40 cm. tall; leaves soft, mostly basal, blades involute, panicles narrow, rather loose, 5 to 15 cm. long, the branches ascending;

glumes 3 to 3.5 mm. long; lemma about half as long as the glumes, 4-toothed, the awn from about the middle of the back; palea about one-third as long as the lemma.

Costa Rica (Volcán de Poás, 2,500 meters, the type); sphagnum bogs.

3. Agrostis stolonifera L. Sp. Pl. 62. 1753. CREEPING BENT.

Spreading perennial, with erect culms from a creeping base; blades flat; panicles narrow, loose; spikelets awnless, the palea well developed.

Costa Rica; wet meadows, introduced from Europe. A good pasture grass.

4. Agrostis verticillata Vill. Prosp. Pl. Dauph. 16. 1779.

Decumbent or spreading perennial; culms 20 to 40 cm. or even as much as 1 meter long; blades flat; panicles dense, more or less interrupted or lobed, 5 to 10 cm., or sometimes 15 cm., long; spikelets about 2 mm. long, the glumes scabrous; lemma and palea about 1 mm. long.

Guatemala; ditches and moist places, 1,000 to 2,000 meters altitude. A European species widely naturalized from southern United States to Argentina at low and medium altitudes.

5. Agrostis perennans (Walt.) Tuck. Amer. Journ. Sci. **45**: 44. 1843.

Cornucopiae perennans Walt. Fl. Carol. 74. 1788.

Lax, often decumbent; culms 40 to 80 cm. tall, with flat blades and narrow, rather diffuse panicles 10 to 20 cm. long, the capillary branches verticillate; spikelets awnless; palea none.

Guatemala (Cobán, 1,300 meters); fields, pastures, and open woods. United States to Bolivia; also in Japan. Type from South Carolina.

6. Agrostis turrialbae Mez, Repert. Sp. Nov. Fedde **18**: 4. 1922.

Rather lax, culms 10 to 30 cm. tall, blades flat, 1 to 2 mm. wide, mostly basal, panicles oblong, open, 5 to 10 cm. long, the branches somewhat divaricately spreading; spikelets about 2 mm. long; lemma 1.5 mm. long, awnless; palea wanting.

Costa Rica (Turrialba, 2,000 to 2,600, the type at 2,600 meters; Cerro de las Vueltas, 2,700 to 3,000 meters); pastures and wet paramos.

7. Agrostis hoffmanni Mez, Repert. Sp. Nov. Fedde **18**: 3. 1922.

Loosely cespitose; culms 30 to 50 cm. tall; blades flat or loosely involute; panicles narrow, 8 to 15 cm. long, the branches ascending or appressed; glumes 3 mm. long; lemma with a bent awn; palea wanting.

Guatemala (Volcán de Agua); Costa Rica (Irazú, the type, and Cerro de la Muerte, 3,100 meters); shady places. Guatemala to Chile.

8. Agrostis tolucensis H. B. K. Nov. Gen. & Sp. **1**: 135. 1816.

Agrostis virescens H. B. K. Nov. Gen. & Sp. 1: 135. 1816.

Erect or somewhat spreading; culms 10 to 50 cm. tall; blades flat or loosely involute; panicles narrow, rather dense or spikelike, often interrupted, 5 to 20 cm. long; glumes 2 to 3 mm. long, scabrous on the keel, sometimes also sparingly on the back; awn present or wanting; palea wanting.

Guatemala, Costa Rica, Panama; paramos and peaks of the high mountains, mostly above 2,700 meters. Mexico, whence the type, to Chile.

32. CINNA L. Sp. Pl. 5. 1753

Spikelets 1-flowered, disarticulating below the glumes, the rachilla forming a stipe below the floret and produced behind the palea as a minute bristle; glumes equal, 1-nerved; lemma similar to the glumes, nearly as long, 3-nerved, bearing a minute, short, straight awn just below the apex; palea apparently 1-nerved, 1-keeled. Tall perennials with flat blades and loose panicles. Species three,

North America and northern Eurasia, two in the United States and one in Mexico and southward.

1. Cinna poaeformis (H. B. K.) Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 24: 21. 1901.

Deyeuxia poaeformis H. B. K. Nov. Gen. & Sp. 1: 146. 1816.
Cinnastrum miliaceum Fourn. Mex. Pl. 2: 91. 1886.
Cinnastrum poaeforme Fourn. Mex. Pl. 2: 91. 1886.

Rather lax, culm about 1 meter tall; blades flat, as much as 7 mm. wide; panicle narrow, open, as much as 40 cm. long, the branches ascending or spreading, naked below, rather densely flowered above; spikelets 3 mm. long; palea as long as lemma; rudiment slender, glabrous.

Costa Rica, Panama; wet thickets and moist banks, 2,000 to 3,000 meters. Mexico, whence the type, to Peru.

33. POLYPOGON Desf. Fl. Atlant. 1: 66. 1798

Spikelets 1-flowered, the pedicel disarticulating a short distance below the glumes, leaving a short-pointed callus attached; glumes equal, entire or 2-lobed, awned from the tip or from between the lobes, the awn slender, straight; lemma much shorter than the glumes, hyaline, usually bearing a slender straight awn shorter than the awns of the glumes. Annuals or perennials, with flat blades and dense, bristly spikelike panicles. Species about 10, in temperate regions, chiefly in the Eastern Hemisphere.

1. Polypogon elongatus H. B. K. Nov. Gen. & Sp. 1: 134. 1816.

Lax, usually decumbent perennial, as much as 1 meter tall; blades flat; panicles narrow, dense but interrupted, nodding, 10 to 20 cm. long; glumes about 3 mm. long, acuminate-aristate; lemma about 1.5 mm. long, the awn about 2 mm. long.

Guatemala, Costa Rica, Panama; marshes, borders of streams, ditches, and wet places, 1,000 to 2,500 meters. Mexico to Argentina. Type from Ecuador.

34. PEREILEMA Presl, Rel. Haenk. 1: 233. *pl. 37. f. a.* 1830

Spikelets 1-flowered, surrounded at base by numerous sterile spikelets in the form of bristles or delicate bracts. Annuals with narrow flat blades and narrow condensed, more or less interrupted, panicles, silky with the numerous awns. Species 3, tropical America.

Lemma about 1.5 mm. long ..... 1. P. crinitum.
Lemma 2 to 3 mm. long ..... 2. P. beyrichianum.

1. Pereilema crinitum Presl, Rel. Haenk. 1: 233. *pl. 37. f. a.* 1830.

Erect annual, 20 to 40 cm. tall; blades flat; panicles dense, spikelike above, interrupted or lobed below, 5 to 15 cm. long, bristly with awns 1 to 2 cm. long; lemma about 1.5 mm. long.

Guatemala, El Salvador, Costa Rica, Panama, whence the type; open ground, brushy slopes and moist banks, at low and medium altitudes. Mexico to Ecuador.

2. Pereilema beyrichianum (Kunth) Hitchc. Contr. U. S. Nat. Herb. 24: 385. 1927.

Pereilema brasilianum Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 4[1]: 136. 1841; 382. 1845.

Differing from *P. crinitum* in the looser interrupted panicle, the lower branches spreading or somewhat reflexed, rather distant, 1 to 2 cm. long; sterile spikelets fewer; lemma 2 to 3 mm. long.

Costa Rica (Lano Grande de Pursical). Moist slopes, Costa Rica to Ecuador and Brazil, whence the type.

35. MUHLENBERGIA Schreb.; Gmel. Syst. Nat. 2: 171. 1791

Spikelets 1-flowered, the rachilla disarticulating above the glumes; glumes usually shorter than the lemma, obtuse to acuminate or awned, the first sometimes small, rarely obsolete; lemma firm-membranaceous, 3 to 5 nerved, with a very short, usually minutely pilose callus, the apex acute, extending into a straight or flexuous awn, or sometimes only mucronate. Perennials or annuals, with narrow or open panicles. Species about 80, mostly in Mexico and the southwestern United States, a few in the eastern part of the Old World.

Plants perennial.
  Second glume 3-toothed----------1. M. quadridentata.
  Second glume entire.
    Culms erect, densely cespitose; panicle open, the branches capillary. 2. M. elata.
    Culms branching and straggling; panicle condensed-----3. M. setarioides.
Plants annual.
  Glumes, or some of them, awned, the awn as long as the body of the glume or longer.
    One glume of some of the upper spikelets of each branch long-awned. 4. M. diversiglumis.
    One glume and often both of all spikelets awned.
      Panicle open, the spikelets somewhat appressed along the spreading primary branches; lemma ciliate----------5. M. ciliata.
      Panicle narrow, the branches appressed; lemma not ciliate--6. M. tenella.
  Glumes not awned, sometimes acute.
    Glumes acute or mucronate; body of lemma 1.5 mm. long--7. M. tenuissima.
    Glumes obtuse; body of lemma 2 to 3 mm. long.
      Pedicels capillary, flexuous or recurved---------- 8. M. implicata.
      Pedicels short, relatively stout, often reflexed but not curved or flexuous. 9. M. microsperma.

1. Muhlenbergia quadridentata (H. B. K.) Kunth, Rév. Gram. 1: 64. 1829.
Podosaemum quadridentatum H. B. K. Nov. Gen. & Sp. 1: 130. 1816.
Muhlenbergia flabellata Mez, Repert. Sp. Nov. Fedde 17: 213. 1921.

Perennial; culms erect from a rhizomatous or decumbent base, 30 to 50 cm. tall; sheaths compressed and with age flattened out and papery; blades rather firm, flat or involute, short, 1 to 2 mm. wide; panicles narrow, condensed, 3 to 10 cm. long; glumes unequal shorter than the lemma, the second 3-toothed, the teeth short, acute; lemma about 4 mm. long, narrowed upward, glabrous, the awn as long as or longer than the body.

Costa Rica (Cerro de Buena Vista, near the summit, 3,100 meters altitude; a specimen beyond maturity with most of the spikelets fallen); grassy hillsides and open woods. Also Mexico, whence the type.

2. Muhlenbergia elata Vasey, Contr. U. S. Nat. Herb. 1: 282. 1893.

Densely cespitose perennial; culms erect, about 1 meter tall; blades involute, scabrous, elongate, slender; panicles open, oblong, 20 to 40 cm. long, the spreading branches and branchlets capillary; glumes soft, 1 and 1.5 mm. long, acute, awnless; lemma 4 to 5 mm. long, the slender awn 5 to 15 mm. long.

Guatemala (Guatemala City); prairies and grassy hills. Mexico, whence the type, to Peru.

3. Muhlenbergia setarioides Fourn. Mex. Pl. **2**: 84. 1886.

Muhlenbergia sylvatica setarioides Beal, Grasses N. Amer. **2**: 249. 1896.

Muhlenbergia polypogonoides Hack. Ann. Naturhist. Hofmus. Wien **17**: 255. 1902.

Perennial; culms branching, straggling, decumbent and rooting at the nodes, as much as a meter or more long; blades flat, 3 to 10 cm. long, 3 to 7 mm. wide, lax; panicles narrow, rather dense but more or less interrupted, 5 to 15 cm. long; glumes unequal, acute, the second 1.5 to 2 mm. long; lemma about 2 mm. long, acuminate, the awn flexuous, 5 to 10 mm. long.

Guatemala, El Salvador, Costa Rica, Panama; moist thickets and shady banks, 1,000 to 2,000 meters. Mexico, whence the type, to Panama.

4. Muhlenbergia diversiglumis Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. **4**[1]: 298. 1841.

Muhlenbergia trinii Fourn.; Hemsl. Biol. Centr. Amer. Bot. **3**: 543. 1885.

Brachyelytrum pringlei Vasey; Beal, Grasses N. Amer. **2**: 267. 1896, as synonym of *Muhlenbergia trinii* Fourn.

Annual; culms branching, slender, soft and lax, creeping or spreading, as much as 40 cm. long; blades flat, 2 to 4 cm. long, 1 to 3 mm. wide; panicles oblong, rather open, 4 to 8 cm. long; lower branches of panicle bearing several spikelets, the upper with a single spikelet, the pedicels slender and flexuous at base, thickened above, sometimes 2 or 3 spikelets on a branch, the pedicels straight and stiffly appressed; glumes very short, scarcely 0.5 mm. long, the first (of the upper spikelets of a branch) bearing a scabrous awn as much as 2 mm. long; lemma narrow, about 4 mm. long, bearing a slender awn 5 to 10 mm. long. The cluster of spikelets ultimately falls entire from the main axis.

Guatemala, El Salvador, Costa Rica; moist banks and brush slopes, 1,200 to 1,800 meters. Mexico, whence the type, to Peru.

5. Muhlenbergia ciliata (H. B. K.) Kunth, Rév. Gram. **1**: 63. 1829.

Podosaemum ciliatum H. B. K. Nov. Gen. & Sp. **1**: 128. 1816.

Annual; culms branching, slender, lax, spreading, 10 to 30 cm. long; blades 2 to 3 cm. long, 1 to 2 mm. wide; panicles 3 to 8 cm. long, the spikelets appressed along the distant spreading branches (these 1 to 2 cm. long); glumes, including the awn-point, about 1 mm. long; lemma about 2 mm. long, the slender awn 5 to 10 mm. long.

Guatemala, El Salvador, Costa Rica, Panama; open ground and shady banks, 700 to 2,000 meters. Mexico, whence the type, to Panama.

6. Muhlenbergia tenella (H. B. K.) Trin. Gram. Unifl. 192. 1824.

Podosaemum tenellum H. B. K. Nov. Gen. & Sp. **1**: 128. 1816.

Muhlenbergia exilis Fourn. Mex. Pl. **2**: 84. 1886.

Annual; culms branching, slender, spreading, 10 to 20 cm. long; blades flat, 1 to 5 cm. long, 1 to 2 mm. wide; panicles narrow, 3 to 6 cm. long, rather densely flowered, the branches appressed, silky from the numerous awns; glumes unequal, broad at base, narrowed to a short awn about as long as the body, the total length of the second about 1 mm.; lemma acuminate, about 2.5 mm. long, the slender awn 10 to 15 mm. long.

Guatemala, El Salvador, Costa Rica, Panama; shady banks, walls, and open ground, at medium altitudes. Mexico, whence the type, to Panama.

7. Muhlenbergia tenuissima (Presl) Kunth, Rév. Gram. **1**: Suppl. XVI. 1830.

Podosaemum tenuissimum Presl, Rel. Haenk. **1**: 230. 1830.

Muhlenbergia nebulosa Scribn.; Beal, Grasses N. Amer. **2**: 247. 1896.

Annual; culms branching, slender, spreading, 10 to 30 cm. long; blades small and narrow; panicles oblong, open, 5 to 10 cm. long, the branches and pedicels

capillary; glumes about equal, about 0.5 mm. long, awnless; lemma about 1.5 mm. long, the awn 5 mm. long.

Panama; savannas, Pacific side. Also Mexico, Pacific slope. Originally described from Panama and Mexico.

8. **Muhlenbergia implicata** (H. B. K.) Kunth, Rév. Gram. 1: 63. 1829.

Podosaemum implicatum H. B. K. Nov. Gen. & Sp. 1: 127. 1816.

Annual, soft and lax; culms branching, slender, spreading, 20 to 40 cm. long; blades 1 to 2 mm. wide, flat, becoming more or less involute; panicles open, 5 to 10 cm. long, the branches and spreading pedicels capillary; glumes unequal, less than 0.5 mm. long, obtuse, awnless; lemma about 2.5 mm. long, acuminate, short-pilose at base, the awn 5 to 10 mm. long.

Guatemala, El Salvador, Costa Rica; rocky hills, shady banks and open ground, 1,000 to 2,000 meters. Mexico, whence the type, to Colombia, Venezuela.

9. **Muhlenbergia microsperma** (DC.) Kunth, Rév. Gram. 1: 64. 1829.

Trichochloa microsperma DC. Cat. Hort. Monsp. 151. 1813.

Podosaemum debile H. B. K. Nov. Gen. & Sp. 1: 128. 1816.

Muhlenbergia debilis Kunth, Rév. Gram. 1: 63. 1829.

Annual; culms branching and spreading, 20 to 40 cm. long; blades 1 to 2 mm. wide; panicles 5 to 10 cm. long, somewhat open, the spikelets on short stiff pedicels along the main branches; glumes unequal, awnless, the second about 1 mm. long; lemma about 2 mm. long, pubescent at base, the awn 5 to 10 mm. long.

Guatemala (Guatemala City); open ground and rocky slopes. Southwestern United States and Mexico, whence the type, to Peru.

36. TRINIOCHLOA Hitchc. Contr. U. S. Nat. Herb. 17: 303. 1913

Spikelets 1-flowered, the rachilla not produced beyond the floret; glumes membranaceous, thin, and papery; lemma narrow, rounded on the back, firmer than the glumes, bearing a stout, geniculate, dorsal awn attached above the middle, 2-toothed at the apex, the teeth slender, the callus densely bearded. Cespitose perennials with narrow, rather few-flowered panicles and spikelets as much as 1 cm. long excluding the awns. Species 3, Mexico to Ecuador.

1. **Triniochloa stipoides** (H. B. K.) Hitchc. Contr. U. S. Nat. Herb. 17: 303. 1913.

Podosaemum stipoides H. B. K. Nov. Gen. & Sp. 1: 131. 1816.

Podosaemum alpestre H. B. K. Nov. Gen. & Sp. 1: 131. 1816.

Muhlenbergia stipoides Kunth, Rév. Gram. 1: 64. 1829.

Avena stipoides Scribn. U. S. Dept. Agr. Div. Agrost. Circ. 19: 4. 1900.

Loosely cespitose perennial; culms 50 to 100 cm. tall, glabrous, somewhat angled; sheaths sulcate, scaberulous; panicles 10 to 20 cm. long, the branches verticillate, distant, ascending or spreading, few-flowered; glumes one-third as long as the lemma; lemma terete, slender, about 1 cm. long; awn about 1 cm. long, attached below the 2-toothed apex.

Guatemala, Costa Rica; grassy hills, 2,000 to 3,000 meters altitude. Mexico to Bolivia. Type from Ecuador.

37. EPICAMPES Presl, Rel. Haenk. 1: 235. *pl. 39*. 1830

Spikelets 1-flowered, the rachilla disarticulating above the glumes; glumes about equal; lemma equaling or longer than the glumes, 3-nerved, often bearing a slender awn just below the tip. Tall cespitose perennials, with open, narrow, or spikelike panicles. Species 15, southwestern United States to northern South America.

Spikelets with a long flexuous awn_____1. **E. emersleyi.**
Spikelets awnless or the awn scarcely exserted.
Panicle narrow but somewhat loose, the branches appressed, some of them as much as 10 cm. long, naked below_____2. **E. stricta.**
Panicle dense and spikelike_____3. **E. macroura.**

1. **Epicampes emersleyi** (Vasey) Hitchc. U. S. Dept. Agr. Bull. **772**: 144. 1920.
Muhlenbergia emersleyi Vasey, Contr. U. S. Nat. Herb. 3: 66. 1892.
Muhlenbergia vaseyana Scribn. Rep. Mo. Bot. Gard. 10: 52. 1899.

Similar to *E. stricta;* spikelets 2 to 3 mm. long, the lemma with a slender flexuous awn as much as 3 cm. long.

Guatemala, Costa Rica, Panama; grassy hillsides and dry prairies, up to 1,500 meters. Southwestern United States to Panama. Type from Arizona.

2. **Epicampes stricta** Presl, Rel. Haenk. 1: 235. *pl. 39.* 1830.

Densely cespitose perennial, 1 to 1.5 meters tall; blades elongate, very scabrous, flat or folded, 1 to 3 mm. wide; panicles grayish, narrow, 30 to 60 cm. long, the numerous branches appressed, some of them as much as 10 cm. long, naked below, rather closely flowered above; glumes 2 to 3 mm. long, scabrous; lemma about as long as the glumes, awnless.

Guatemala; dry or rocky hills and sandy prairies, at medium altitudes. Mexico, whence the type, the exact locality not known. The identity of *E. stricta* Presl is uncertain, and the name is used only tentatively for the species here described.

3. **Epicampes macroura** (H. B. K.) Benth. Journ. Linn. Soc. Bot. 19: 87. 1881.
Crypsis macroura H. B. K. Nov. Gen. & Sp. 1: 140. 1816.

Culms erect, densely cespitose; blades involute, slender, elongate, scabrous; panicles pale or dark, dense and spikelike, 10 to 30 cm. long; glumes acute or acuminate, about 6 to 7 mm. long; lemma shorter than the glumes, awnless.

Guatemala; dry hills and slopes, 2,000 to 3,000 meters. Mexico, whence the type.

38. SPOROBOLUS R. Br. Prodr. Fl. Nov. Holl. 169. 1810

Spikelets 1-flowered, the rachilla disarticulating above the glumes; glumes usually unequal, the second often as long as the spikelet; lemma membranaceous, 1-nerved, awnless; palea usually prominent and as long as the lemma or longer; seed free from the pericarp. Annuals or perennials, with small spikelets in open or contracted panicles. Species about 95, in the warm regions of both hemispheres, most abundant in America.

Plants annual.
Glumes unequal, the second as long as the spikelet, the first half as long.
Panicle open, the branches spreading, naked below; spikelets about 1.5 mm. long_____1. **S. macrospermus.**
Panicle narrow, almost spikelike, the branches appressed, floriferous from base; spikelets about 2 mm. long_____2. **S. ciliatus.**
Glumes about equal.
Pedicels short, rather stout_____3. **S. ramulosus.**
Pedicels capillary_____4. **S. minutissimus.**

Plants perennial.
Creeping rhizomes conspicuous_____5. **S. littoralis.**
Creeping rhizomes wanting, the plants cespitose.
Second glume as long as the spikelet, the first about half as long.

Spikelets 2.5 to 4 mm. long.
Basal sheaths copiously felty-ciliate; spikelets 3.5 to 4 mm. long.
6. S. cubensis.
Basal sheaths not felty; spikelets 2.5 mm. long____7. S. purpurascens.
Spikelets 1.5 mm. long_____8. S. argutus.
Second and first glumes about equal, much shorter than the spikelet.
Panicle branches slender, rather loosely arranged; blades slender and lax; glumes about 0.3 mm. long, nearly equal_____9. S. indicus.
Panicle branches short, contiguous, forming a narrow, rather compact spike; blades firm, as much as 5 mm. wide; glumes 0.5 to 1 mm. long, unequal_____10. S. elongatus.

1. Sporobolus macrospermus Scribn.; Beal, Grasses N. Amer. 2: 302. 1896.

Erect, slender annual, 15 to 30 cm. tall; blades short and narrow, pilose on the upper surface; panicle oblong, open, 3 to 6 cm. long, the slender branches in whorls, spreading, 1 to 2 cm. long; spikelets brownish, a little more than 1.5 mm. long; first glume about half as long as the spikelet; second glume as long as the spikelet.

Guatemala (Laguna de Ayarza, 2,500 meters); open ground. Mexico, whence the type, and Guatemala.

2. Sporobolus ciliatus Presl, Rel. Haenk. 1: 242. 1830.

Vilfa ciliata Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 4[1]: 63. 1840.
Vilfa preslii Steud. Nom. Bot. ed. 2. 2: 768. 1841.

Annual; culms 10 to 30 cm. tall, the leaves mostly toward the base; blades rather stiff, mostly 5 to 10 cm. long, as much as 5 mm. wide; panicle spike-like somewhat interrupted mostly bronze brown; spikelets a little less than 2 mm. long; first glume less than half as long as the spikelet; second glume as long as the spikelet.

Honduras, Costa Rica, Panama; savannas, Pacific side, at low altitudes. Honduras to Brazil. Type from Panama.

3. Sporobolus ramulosus (H. B. K.) Kunth, Rév. Gram. 1: 68. 1829.

Vilfa ramulosa H. B. K. Nov. Gen. & Sp. 1: 137. 1816.
Sporobolus racemosus Vasey, Bull. Torrey Club 14: 9. 1887.

Slender erect or spreading branching annual, 5 to 15 cm. tall; blades small and narrow; panicles oblong, 1 to 5 cm. long, open, the ultimate pedicels rather short and stiff; spikelets a little more than 1 mm. long, acute; glumes nearly equal, about half as long as the spikelet.

Guatemala (Santa María; Todos los Santos, 3,000 meters); Costa Rica (Volcán de Irazú); open ground. Southwestern United States to Guatemala. Type from Mexico.

4. Sporobolus minutissimus (Steud.) Hitchc. Proc. Biol. Soc. Washington 41: 161. 1928.

Agrostis minutissima Steud. Syn. Pl. Glum. 1: 171. 1854.
Vilfa confusa Fourn. Mex. Pl. 2: 101. 1886.
Sporobolus confusus Vasey, Bull. Torrey Club 15: 293. 1888.

Rather delicate annual, 10 to 30 cm. tall, erect or spreading; blades about 1 mm. wide; panicles usually more than half the entire length of the plant, oblong, open, the flexuous slender branches spreading; spikelets about 1 mm. long; glumes equal, about half as long as the spikelet, sometimes plubescent.

Guatemala (Santa María, Volcán de Agua); Costa Rica; open ground at medium altitudes. Western United States to Costa Rica. Type from Mexico.

5. Sporobolus littoralis (Lam.) Kunth, Rév. Gram. 1: 68. 1829.

Agrostis littoralis Lam. Tabl. Encycl. 1: 161. 1791.

Culms 50 to 70 cm. or even as much as 100 cm. tall, erect from extensively creeping hard scaly rhizomes; leaves numerous, conspicuously distichous, the sheaths overlapping; blades firm, involute-pointed; panicles spikelike, commonly 10 to 15 cm. long. Extensive colonies of sterile plants often found along sandy beaches.

Guatemala, Honduras, Costa Rica, Panama; salt marshes and sandy soil along the seacoast. Southern Florida to Brazil. Originally described from tropical America.

6. Sporobolus cubensis Hitchc. Contr. U. S. Nat. Herb. 12: 237. 1909.

Plants in dense bunches with numerous innovations; culms 30 to 60 cm. tall, the basal sheaths (especially of the innovations) woolly or villous; blades long and narrow, firm, folded; panicle narrow but open, the branches ascending, more or less whorled; spikelets 3 mm. long, the first glume about half as long.

Costa Rica (Cañas Gordas); Panama (Frijoles); savannas, at low altitudes. Costa Rica and the West Indies to Venezuela, and British Guiana. Type from Isle of Pines.

7. Sporobolus purpurascens (Swartz) Hamilt. Prodr. Pl. Ind. Occ. 5. 1825.

Agrostis purpurascens Swartz, Prodr. Veg. Ind. Occ. 25, 1788.

Erect perennial, 30 to 50 cm. tall; blades mostly basal, 4 to 8 mm. wide, ciliate near base; panicles condensed, brownish drab, 8 to 15 cm. long, the short branches in whorls; spikelets 3 mm. long; first glume less than half as long as the spikelet; second glume as long as the spikelet.

Guatemala (Cobán); Costa Rica; grassland, at low and medium altitudes. Mexico and the West Indies to Brazil and Bolivia. Type from Jamaica.

8. Sporobolus argutus (Nees) Kunth, Enum. Pl. 1: 215. 1833.

Vilfa arguta Nees, Agrost. Bras. 395. 1829.

Low tufted glabrous perennial; culms spreading; blades short, rather thick, subinvolute; panicles pale, many-flowered, at first contracted, at maturity narrowly pyramidal or oblong; spikelets 1.5 mm. long; first glume about half as long as the spikelet, the second as long as the spikelet.

El Salvador; open sandy or alkaline soil, at low altitudes. Southwestern United States and the West Indies to Argentina. Type from Brazil.

9. Sporobolus indicus (L.) R. Br. Prodr. Fl. Nov. Holl. 170. 1810.

Agrostis indica L. Sp. Pl. 63. 1753.

Sporobolus jacquemontii Kunth, Rév. Gram. 2: 427. *pl. 127.* 1831.

Culms erect, 0.6 to 1 meter tall, in large clumps with numerous leafy shoots at the base; panicle 15 to 30 cm. long, the slender branches ascending, the short-pediceled spikelets mostly borne along the lower side. Often forming an almost pure stand on open slopes, an important constituent of native pastures.

Costa Rica, Panama; savannas and dry hills, at low altitudes. Mexico and the West Indies to Colombia and Brazil. Type from Jamaica.

10. Sporobolus elongatus R. Br. Prodr. Fl. Nov. Holl. 170. 1810.

Agrostis elongata Lam. Tabl. Encycl. 1: 162. 1791.

Vilfa berteroana Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 4[1]: 100. 1840.

Sporobolus berteroanus Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 370. 1917.

Resembling the preceding, the panicle narrower, the shorter densely flowered branches erect. The abundant reddish ripe grains extruded from the glumes often remain attached to the panicle by their mucilaginous coats. Often affected by a black fungus.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; open ground, waste places and pastures, at low and medium altitudes, introduced from Asia into all of tropical America.

ORYZOPSIS SELERI Pilger, Verh. Bot. Ver. Brand. 51: 192. 1909. I have not seen the type of this species (Guatemala, *Seler* 3238). It is said to be allied to *O. fimbriata* (Kunth) Hemsl.

39. STIPA L. Sp. Pl. 78. 1753. NEEDLEGRASS

Spikelets 1-flowered, disarticulating above the glumes, the articulation oblique, leaving a bearded, sharp-pointed callus attached to the base of the floret; glumes membranaceous, often papery, acute or acuminate, usually long and narrow; lemma narrow, terete, firm or indurate, strongly convolute, terminating in a bent and twisted, prominent, persistent awn; palea inclosed in the convolute lemma. Perennials, with usually convolute blades and narrow panicles. Species about 100, in temperate regions, especially on plains and steppes.

1. **Stipa ichu** (Ruiz & Pav.) Kunth, Rév. Gram. 1: 60. 1829. ICHU GRASS.
Jarava ichu Ruiz & Pav. Fl. Peruv. Chil. 1: 5. *pl. 6. f. b.* 1798.
Stipa liebmanni Fourn. Mex. Pl. 2: 76. 1886.

Culms closely cespitose, often in large bunches, erect, wiry, 80 to 100 cm. tall; blades flat or usually closely involute, elongate, wiry, scabrous; panicles narrow, shiny, pale or purplish, 15 to 40 cm. long, densely flowered, soft and silky; glumes about 1 cm. long, papery; lemma fusiform, about 2.5 mm. long, short-pubescent, the short neck bearing a conspicuous tuft of hairs 3 to 4 mm. long; awn slender, 1 to 2 cm. long, flexuous.

Guatemala (Volcán de Agua); El Salvador (above Escasú); dry hills and plains at high altitudes. Mexico to Chile. Type from Peru.

40. ARISTIDA L. Sp. Pl. 82. 1753

Spikelets 1-flowered, the rachilla disarticulating obliquely above the glumes; glumes narrow, acute, accuminate, or awn-tipped; lemma indurate, narrow, terete, convolute, with a hard, sharp-pointed, usually minutely bearded callus at base, terminating above in a usually trifid awn. Annuals or perennials, with narrow, frequently convolute blades and narrow or open panicles. Species about 150, in warmer regions.

Lateral awns minute (less than 1 mm. long), or wanting.
  Awn (column) twisted at base ..... 2. A. schiedeana.
  Awn not twisted.
    Plants annual ..... 3. A. jorullensis.
    Plants perennial ..... 1. A. ternipes.
Lateral awns well developed.
  Plants annual.
    Column as long as the lemma, twisted; awns about 5 mm. long. 4. A. capillacea.
    Column short or wanting, not twisted; awns 10 to 15 mm. long. 5. A. adscensionis.
Plants perennial.
  Panicle open, the branches spreading, naked at base.
    Branches of panicle stiffly spreading or reflexed at base; beak of lemma mostly less than 2 mm. long, slightly twisted ..... 6. A. divaricata.
    Branches of panicle drooping; beak of lemma 3 to 5 mm. long, twisted. 7. A. laxa.

Panicle narrow, the branches ascending or appressed.
Column 1 cm. or more long, twisted_____8. A. implexa.
Column not more than 5 mm. long.
Column of awn at maturity 3 to 5 mm. long, twisted__9. A. arizonica.
Column of awn less than 3 mm. long.
Awns at maturity equally divergent, not spirally contorted at base.
10. A. liebmanni.
Awns at maturity unequally divergent, or spirally contorted at base.
Central awn with a long semicircular curve; lateral awns shorter than the central.
Lateral awns spreading, half as long as the central_11. A. torta.
Lateral awns erect, two-thirds as long as the central.
12. A. virgata.
Central awn not semicircular; awns equal, contorted at base.
13. A. recurvata.

1. Aristida ternipes Cav. Icon. Pl. 5: 46. 1799.

Streptachne scabra H. B. K. Nov. Gen. & Sp. 1: 124. *pl. 40.* 1816.

Aristida scabra Kunth, Rév. Gram. 1: 62. 1829.

Ortachne scabra Fourn. Bull. Soc. Bot. France 27: 295. 1880.

Erect perennial; culms 50 to 100 cm. tall; blades flat, involute above, tapering into a fine point, 2 to 3 mm. wide; panicle open, one-third to half the entire length of the culm, the branches few, distant, spreading, scabrous, mostly naked at base; spikelets appressed at the ends of the branches; glumes about equal, 8 to 10 mm. long; lemma gradually narrowed into a laterally compressed scabrous falcate beak, this extending into a single arcuate awn 10 to 15 mm. long; lateral awns minute or obsolete.

Guatemala, Honduras, Salvador, Nicaragua, Costa Rica, Panama; rocky hills and dry plateaus, Arizona to Colombia, also in Cuba. Type from Panama.

A fragmentary specimen from Grenada, Nicaragua, may be var. *divergens* (Vasey) Hitchc. which is distinguished by being prostrate or spreading, and having a smaller less diffuse panicle with stiffly spreading or somewhat deflexed branches.

2. Aristida schiedeana Trin. & Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. 5 [1]: 120. 1842.

Erect perennial; culms 30 to 60 cm. tall; blades as much as 3mm. wide; panicles open, as much as 30 cm. long, the branches few, distant, spreading, naked below; glumes 10 to 15 mm. long; lemma 8 to 10 mm. long, gradually narrowed into a scabrous twisted column, the total length to the bend 10 to 15 mm.; central awn divergent, 5 to 10 mm. long; lateral awns minute or obsolete.

Guatemala (Guatemala City); rocky hills and plains. Southwestern United States to Guatemala. Type from Mexico.

3. Aristida jorullensis Kunth, Rév. Gram. 1: 62. 1829.

Streptachne pilosa H. B. K. Nov. Gen. & Sp. 1: 124. 1816. Not *Aristida pilosa* Labill.

Ortachne pilosa Nees, Seem. Bot. Voy. Herald 225. 1854.

Annual; culms slender, branching, 20 to 40 cm. tall; blades 1 to 2 mm. wide, bearing scattered long hairs; panicles narrow, 10 to 20 cm. long, the axis slender, somewhat flexuous, elongating at maturity and becoming as much as 1 meter long and more or less prostrate; glumes nearly equal, 5 to 7 mm. long; lemma extending into a compressed beak and this into a scabrous curved or flexuous awn 15 to 35 mm. long; lateral awns wanting.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; dry open ground, at low altitudes, Pacific side. Mexico, whence the type, to Panama.

4. Aristida capillacea Lam. Tabl. Encycl. 1: 156. 1791.

Delicate annual, usually much-branched at base; culms erect, 10 to 20 cm. tall; panicles oblong, open, rarely more than 7 cm. long, the branches capillary; glumes 2.5 and 3 mm. long; lemma about 2 mm. long, extending into a slender twisted column about 2 mm. long; awns about equal, 5 mm. long.

Honduras, British Honduras, Costa Rica, Panama; dry savannas, pastures and open ground, at low and medium altitudes. Mexico to Brazil and Bolivia. Type from French Guiana.

5. Aristida adscensionis L. Sp. Pl. 82. 1753.

Aristida humilis H. B. K. Nov. Gen. & Sp. 1: 121. 1816.

Aristida bromoides H. B. K. Nov. Gen. & Sp. 1: 122. 1816.

Annual, much branched at base; culms 10 to 80 cm. tall; panicles narrow, erect, 5 to 10 cm. long in the smaller plants, looser, larger, and somewhat drooping in the larger plants; first glume 5 to 7 mm. long, the second 8 to 10 mm. long; lemma 8 to 9 mm. long, compressed toward the scarcely beaked summit; awns about equal, 10 to 15 mm. long, equally divergent, flat and straight at base.

Guatemala (Guatemala City; Santa Ana); dry open ground, at low and medium altitudes. Southern United States and West Indies to Argentina; warm regions of the Old World. Type from Ascension Island.

6. Aristida divaricata Humb. & Bonpl.; Willd. Enum. Pl. 1: 99. 1809.

Aristida humboldtiana Trin. & Rupr. Mém. Acad. St. Pêtersb. VI. Sci. Nat. 5 [1]: 118. 1842.

Perennial; culms erect or spreading, 30 to 60 cm. long; blades flat or involute, less than 3 mm. wide; panicles large and diffuse, usually as much as half the entire length of the culm, the branches spreading or deflexed, naked below; glumes nearly equal, about 1 cm. long; lemma about 1 cm. long, narrowed into a scabrous more or less twisted beak about 2 mm. long; awns about equal, 10 to 15 mm. long, straight at base.

Guatemala (Guatemala City); dry hills and plains. Southwestern United States to Guatemala. Type from Mexico.

7. Aristida laxa Cav. Icon. Pl. 5: 44. *pl. 470. f. i.* 1799.

Aristida spadicea H. B. K. Nov. Gen. & Sp. 1: 123. 1816.

Erect perennial; culms as much as 1 meter tall; blades flat, the old ones curled and flexuous, 1 to 2 mm. wide; panicle large and open, 15 to 30 cm. long, the branches few and distant, drooping, as much as 15 cm. long, naked below; spikelets appressed along the upper part of the branches; glumes about equal, 8 to 12 mm. long, awn-pointed; lemma 10 to 15 mm. long including the twisted beak 3 to 5 mm. long; awns about equal or the lateral shorter, sometimes only half as long as the central, this 10 to 15 mm. long.

British Honduras; prairies and sterile hills. Mexico to Colombia. Type from Mexico.

8. Aristida implexa Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 2 [1]: 48. 1836.

Erect perennial; culms 30 to 50 cm. tall; blades flat at base, as much as 3 mm. wide; panicle dense and spikelike, 10 to 20 cm. long; first glume about 15 mm. long, the second 10 to 12 mm. long, both awned; lemma about 7 mm. long, the column strongly twisted, 2 to 2.5 cm. long; awns about equal, about 3 cm. long.

Salvador, Panama; plains and rocky slopes, Pacific side. Brazil, whence the type, to Paraguay.

9. Aristida arizonica Vasey, Bull. Torrey Club **13**: 27. 1886.
Aristida pseudospadicea Hubb. Proc. Amer. Acad. 49: 500. 1913.
Aristida orizabensis var. *pseudospadicea* Henr. Med. Rijks Herb. Leiden 54B: 473. 1928.

Erect perennial; culms 30 to 120 cm. tall; blades 1 to 4 mm. wide, flat or sometimes involute; panicle erect, narrow, dense or more or less interrupted at base, 10 to 25 cm. long; glumes equal, 10 to 15 mm. long, short-awned; lemma 1 to 1.5 cm. long, including the more or less twisted beak (column) 3 to 5 mm. long; awns about equal, 1 to 2 cm. long.

Guatemala, British Honduras, El Salvador, Panama; dry plains, stony hillsides, and open forest, mostly 1,500 to 2,500 meters. Southwestern United States to Panama. Type from New Mexico.

10. Aristida liebmanni Fourn. Mex. Pl. **2**: 78. 1886.

Erect perennial; culms as much as 50 cm. tall; blades flat, involute above, 2 mm. wide; panicle narrow, 10 to 15 cm. long; glumes about equal, 1 cm. long; lemma about as long as the glumes, the somewhat twisted beak 2 mm. long; awns somewhat divergent, the central 1.5 to 2 cm. long, the lateral a little shorter.

Guatemala (vicinity of Izabel); savannas. Mexico, whence the type, and Guatemala.

11. Aristida torta (Nees) Kunth, Enum. Pl. **1**: 190. 1833.
Chaetaria torta Nees, Agrost. Bras. 386. 1829.
Aristida breviglumis Mez, Repert. Sp. Nov. Fedde **17**: 152. 1921.

Erect perennial; culms 40 to 80 cm. tall; blades flat or involute, 1 to 3 mm. wide; panicle narrow, rather dense, 8 to 15 cm. long; glumes nearly equal, about 6 mm. long; lemma about 5 mm. long including the straight beak 1 mm. long; central awn 1.5 to 2 cm. long, with a long semicircular curve, the lateral about half as long, somewhat divergent.

Costa Rica, Panama; dry plains and grassy hillsides, Pacific side. Also Brazil, whence the type.

12. Aristida virgata Trin. in Spreng. Neu. Entd. **2**: 60. 1821.

Erect perennial; culms 50 to 80 cm. tall; blades flat, rather lax, 1 to 2 mm. wide; panicle slender, narrow, erect, not very stiff, rather loosely flowered, one-third to half the entire length of the culm, the branches mostly short and somewhat appressed, 1 to 2 cm. long; glumes about equal, 6 to 7 mm. long; lemma 4 to 5 mm. long; central awn horizontally spreading or somewhat reflexed, 1.5 to 2 cm. long, the lateral erect, about two-thirds as long as the central.

Honduras (Siguatepeque, Dept. Comayagua, 1,080 to 1,400 meters). Moist sandy soil, New Jersey to Florida, Mississippi, and Central America. Type from Philadelphia.

13. Aristida recurvata H. B. K. Nov. Gen. & Sp. **1**: 123. 1816.

Erect perennial; culms 60 to 100 cm. tall; blades flat, as much as 2 mm. wide, the margins thickened, the involute point long and slender, the old blades often flexuous around the base of the plant; panicle narrow, rather loose, 10 to 30 cm. long; glumes about equal, awn-pointed, about 1 cm. long; lemma about 4 mm. long, with a slightly twisted column 2 to 3 mm. long; awns equal, about 1 cm. long, the base curved in a warped twist.

Panama; prairies and rocky slopes, Pacific side. Panama to Brazil. Type from Venezuela.

41. ANTHEPHORA Schreb. Beschr. Gräs. 2: 105, *pl. 44*. 1810

Spikelets in clusters of 4, the indurate first glumes united at base, forming a pitcher-shaped pseudo-involucre, the clusters subsessile and erect on a slender flexuous continuous axis. Glumes rigid, acute, or produced into short awns. Species 5, 4 in Africa and 1 in tropical America.

1. Anthephora hermaphrodita (L.) Kuntze, Rev. Gen. Pl. 2: 759. 1891.

Tripsacum hermaphroditum L. Syst. Nat. ed. 10. 2: 1261. 1759.

Anthephora elegans Schreb. Beschr. Gräs. 2: 105. *pl. 44*. 1810.

Leafy ascending or decumbent branching annual; culms mostly 20 to 50 cm. tall; blades flat, thin, 5 to 10 mm. wide; spikes erect, 5 to 10 cm. long; glumes 5 to 7 mm. long.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama. Sandy river banks, open ground and waste places. Throughout tropical America. Type from Jamaica.

42. HILARIA H. B. K. Nov. Gen. & Sp. 1: 116. *pl. 37*. 1816

Spikelets sessile, in groups of 3, the groups falling from the axis entire, the central spikelet (next the axis), fertile, 1-flowered, the 2 lateral spikelets staminate, 2-flowered; glumes coriaceous, those of the 3 spikelets forming a false involucre, in some species connate at the base, more or less asymmetric, usually bearing an awn on one side from about the middle; lemma and palea hyaline, about equal in length.

Low perennials, the groups of spikelets appressed to the axis, in terminal spikes. Species five, in arid regions, southwestern United States to Central America.

1. Hilaria cenchroides H. B. K. Nov. Gen. & Sp. 1: 117. 1816.

Low perennial, forming wiry stolons, with tufts of culms at intervals of 5 to 15 cm.; culms 10 to 20 cm. tall, bearing a solitary spike 1 to 3 cm. long; blades 2 to 5 cm. long, 2 to 3 mm. wide, sharp-pointed; clusters of spikelets 4 to 5 mm. long on a zigzag axis, mostly dark colored.

Guatemala. Dry plains and hills. Also Mexico, whence the type.

43. AEGOPOGON Humb. & Bonpl.; Willd. Sp. Pl. 4: 899. 1806

Spikelets short-pedicellate, in groups of 3, the group short-pedunculate, spreading, the peduncle disarticulating from the axis and forming a pointed stipe below the group, this falling entire; central spikelet shorter pedicellate, fertile, the 2 lateral ones longer, pedicellate and staminate or neuter; glumes membranaceous, notched at the apex, the midnerve extending into a point or awn; lemma and palea thinner than the glumes, extending beyond them, the lemma 3-nerved, the central nerve and sometimes also the lateral ones extending into awns, the palea 2-awned.

Low lax annuals, with solitary loose racemes of delicate flower clusters. Species three, Arizona to Bolivia.

Lobes of glumes acute or awned, firm, purplish_____1. **A. cenchroides.**

Lobes of glumes rounded, broad, papery_____2. **A. tenellus.**

1. Aegopogon cenchroides Humb. & Bonpl.; Willd. Sp. Pl. 4: 899. 1806.

Aegopogon geminiflorus H. B. K. Nov. Gen. & Sp. 1: 133. *pl. 43*. 1816.

Culms 20 to 50 cm. long, the longer ones trailing and spreading; blades mostly less than 5 cm. long, 1 to 2 mm. wide; raceme 2 to 5 cm. long; clusters of spike-

lets finally nodding on pubescent peduncles 1 to 2 mm. long; main awn mostly 5 to 10 mm. long.

Guatemala, Honduras, Costa Rica, Panama; cliffs and dry slopes. Mexico to Bolivia. Type from Venezuela.

2. **Aegopogon tenellus** (Cav.) Trin. Gram. Unifl. 164. 1824.
Lamarckia tenella DC. Cat. Hort. Monsp. 120. 1813.
Cynosurus tenellus Cav.; DC. Cat. Hort. Monsp. 120. 1813.
Aegopogon unisetus Roem. & Schult. Syst. Veg. 2: 805. 1817.

Differs from *A. cenchroides* in the smaller cluster of spikelets and the broad obtuse papery lobes of the glumes.

Guatemala, El Salvador; Costa Rica; cliffs and banks. Arizona to northern South America. Type from botanical garden, Montpellier, France; origin of type unknown.

44. FOURNIERA Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 7. *f. 1, 2, 3.* 1897

Plants dioecious or monoecious; spikelets dissimilar, solitary and sessile at the alternate notches of a continuous flexuous rachis, readily falling off at maturity from the small cushion-like barbate pedicels; rachis alternately striate and sulcate; staminate spikelet 2-flowered, the first floret sessile, the second on a short naked stipe or joint of the rachilla, this not prolonged beyond; glumes 3, 2 small and narrow, somewhat toward one side, the third larger; lemma of lower floret 3-nerved, acute, of upper floret similar but 3-cleft at apex, the middle division awn-like; stamens 3; pistillate spikelet 2-flowered, the upper floret reduced to a 3-awned rudiment; glumes 3, about equal, cuneate, broadest above, narrowed below into a short rather densely pubescent pedicel-like base or claw, the apex obtuse, somewhat erose, 2 of the glumes with one strong and 2 faint nerves, the other with 2 strong and 2 faint nerves; first floret raised on a short stipe; lemma 3-nerved, 3-cleft at apex, the middle division longest, sometimes 2-toothed and mucronate between the teeth. A single species. The genus is an anomalous one and its affinities doubtful. It may belong in Chlorideae near *Bouteloua*. The morphology of the three bracts that appear to be glumes needs investigation. The upper may be a sterile lemma, or the lower may represent a suppressed spikelet. In the staminate spikelets the three glumes are obviously one above the other on the axis, but in the pistillate the three appear to be in a whorl.

1. **Fourniera mexicana** Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 8. *f. 1, 2, 3.* 1897.

Rather delicate extensively creeping or stoloniferous, apparently annual; blades 2 to 6 cm. long, 1 to 2 mm. wide; racemes terminal and axillary, 2 to 4 cm. long, the rachis slender and zigzag, the internodes about 2 mm. long; spikelets 4 to 5 mm. long.

El Salvador (La Unión). Open flat pasture land near the coast. Also Mexico, the type from Acapulco.

The original description states that the plant is dioecious. The specimen from La Unión is monoecious, the two sexes on different tufts. Only two collections are known, one from La Unión and one from Acapulco.

45. LEPTOCHLOA Beauv. Ess. Agrost. 71, 166. *pl. 15, f. 1.* 1812

Spikelets 2 to several-flowered, sessile or short-pediceled, approximate or somewhat distant along one side of a slender rachis, the rachilla disarticulating above the glumes and between the florets; glumes unequal or nearly equal,

awnless or mucronate, 1-nerved, usually shorter than the first lemma; lemmas obtuse or acute, sometimes 2-toothed and mucronate or short-awned from between the teeth, 3-nerved, the nerves sometimes pubescent. Annuals or perennials with flat blades and numerous racemes scattered along a common axis forming a long or sometimes short panicle. Species, probably 20, in the warmer regions of both hemispheres.

Plants perennial.
Sheaths and blades glabrous; lemmas awnless or nearly so____1. L. virgata.
Sheaths and blades sparsely pilose; lemmas awned_____2. L. domingensis.
Plants annual.
Sheaths, at least the upper, papillose-pilose_____3. L. filiformis.
Sheaths minutely scabrous but not pilose_____4. L. scabra.

1. Leptochloa virgata (L.) Beauv. Ess. Agrost. 166. 1812.
Cynosurus virgatus L. Syst. Nat. ed. 10 2: 876. 1759.

Culms in small tufts, tall, slender, strong and wiry, sparingly branching; blades flat; racemes commonly about 10 cm. long, lax, ascending, aggregate toward the summit of the culm.

Guatemala, British Honduras, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; open ground and thickets, at low altitudes. Mexico and the West Indies to Argentina. Type from Jamaica.

2. Leptochloa domingensis (Jacq.) Trin. Fund. Agrost. 133. 1820.
Cynosurus domingensis Jacq. Misc. Austr. 2: 363. 1781.

Resembling *L. virgata*, the sheaths and blades sparsely pilose, the panicles more elongate, the racemes shorter and more numerous; lemmas awned.

Nicaragua (Jinotepe, Mesaya); open ground and grassy banks, Florida, Mexico, and the West Indies to Bolivia and Argentina. Type locality not known, presumably Santo Domingo.

3. Leptochloa filiformis (Lam.) Beauv. Ess. Agrost. 71, 166. 1812.
Festuca filiformis Lam. Tabl. Encycl. 1: 191. 1791.
Eleusine mucronata Michx. Fl. Bor. Amer. 1: 65. 1803.
Leptochloa mucronata Kunth, Rév. Gram. 1: 91. 1829.
Leptochloa paniculata Fourn. Bull. Soc. Bot. France II. 27: 296. 1880.

Culms ascending or erect, geniculate below, branching at the base, commonly 40 to 70 cm. tall (dwarf specimens 10 to 20 cm. tall); blades thin, flat; racemes very slender, spreading.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; fields and open ground at low altitudes. Southern United States, Mexico, and the West Indies to Argentina. Type from tropical America, the exact locality not known.

4. Leptochloa scabra Nees, Agrost. Bras. 435. 1829.

Stout, rather succulent annual as much as 1 meter tall, with scabrous sheaths, flat blades, and narrow panicles as much as 30 cm. long; racemes closely arranged, ascending, somewhat flexuous, 3 to 8 cm. long.

El Salvador, Costa Rica; ditches and wet places, at low altitudes. Louisiana and the West Indies to Brazil, whence the type.

46. GOUINIA Fourn. Mex. Pl. 2: 103. 1886

Spikelets few-flowered, short-pedicellate, appressed, in slender elongate racemes, these racemosely arranged; glumes and lemmas keeled, the lemmas densely villous on the nerves, awned, the uppermost much reduced but awned. Erect rather robust perennials with flat blades and terminal panicles of slender racemes. Species 6, Mexico and the West Indies to Paraguay.

1. **Gouinia virgata** (Presl) Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 10. 1897.

Bromus virgatus Presl, Rel. Haenk. 1: 263. 1830.
Festuca fournieriana Hemsl. Biol. Centr. Amer. Bot. 3: 581. 1885.
Gouinia polygama Fourn. Mex. Pl. 2: 103. 1886.
Diplachne guatemalensis Hack. Oesterr. Bot. Zeitschr. 52: 275. 1902.

Erect wiry perennial about 1 meter tall; blades flat; panicle large, open, of 5 to 8 distant spreading racemes as much as 15 cm. long, floriferous to base; spikelets appressed, somewhat imbricate.

Guatemala, Honduras, El Salvador, Nicaragua; thickets and open woods, at low altitudes. Mexico, whence the type, and Cuba to Brazil and Bolivia.

47. ELEUSINE Gaertn. Fruct. & Sem. 1: 7. *pl. 1. f. 11.* 1788

Spikelets few to several-flowered, compressed, sessile and closely imbricate, in two rows along one side of a rather broad rachis, the latter not prolonged beyond the spikelets; rachilla disarticulating above the glumes and between the florets, glumes unequal, rather broad, acute, 1-nerved, shorter than the first lemma; lemmas acute, with 3 strong green nerves close together forming a keel, the uppermost somewhat reduced; seed dark brown, roughened by fine ridges, loosely inclosed in the thin pericarp. Annuals, with two to several rather stout spikes, digitate at the summit of the culms, sometimes with one or two a short distance below, or rarely with a single terminal spike. Species about six, one in South America, the others in the warm regions of the Eastern Hemisphere, one of these a common introduced weed in America.

1. **Eleusine indica** (L.) Gaertn. Fruct. & Sem. 1: 8. 1788. YARDGRASS.

Cynosurus indicus L. Sp. Pl. 72. 1753.

Weedy annual with spreading or ascending flattened branching culms, thin flat linear blades, and 2 to several spikes (sometimes one spike 1 to 3 cm. below), 5 to 10 cm. long.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; a weed in open ground and waste places. Warm regions of the Old World; introduced in America.

48. DACTYLOCTENIUM Willd. Enum. Pl. 1029. 1809

Spikelets 3 to 5 flowered, compressed, sessile and closely imbricate, in two rows along one side of the rather narrow flat rachis, the end projecting in a point beyond the spikelets; rachilla disarticulating above the first glume and between the florets; glumes somewhat unequal, broad, 1-nerved, the first persistent upon the rachis, the second mucronate or short-awned below the tip, deciduous; lemmas firm, broad, keeled, acuminate or short-awned, 3-nerved, the lateral nerves indistinct, the upper floret reduced; the palea about as long as the lemma; seed subglobose, ridged or wrinkled, inclosed in a thin, early-disappearing pericarp. Annuals or perennials, with flat blades and two to several short thick spikes, digitate and widely spreading at the summit of the culms. Species three, in the warmer parts of the Eastern Hemisphere, one a common weed in tropical America.

1. **Dactyloctenium aegyptium** (L.) Richt. Pl. Eur. 1: 68. 1890.

CROWFOOT GRASS.

Cynosurus aegyptius L. Sp. Pl. 72. 1753.
Eleusine aegyptiaca Desf. Fl. Atlant. 1: 85. 1798.

Weedy stoloniferous, more or less pilose annual, often forming dense mats, the flat culms 10 to 50 cm. long, the blades flat, usually short, the spikes 2 to 4, short, thick, radiate at the apex of the culm.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; a weed in fields and waste places at low altitudes. Tropical regions of the Old World, introduced in America.

49. CYNODON L. Rich.; Pers. Syn. Pl. 1: 85. 1805

(*Capriola* Adans. Fam. Pl. 2: 31, 532. 1763. Ineffectively published)

Spikelets 1-flowered, awnless, sessile in two rows along one side of a slender continuous rachis, the rachilla disarticulating above the glumes and prolonged behind the palea as a slender naked bristle, this sometimes bearing a rudimentary lemma; glumes narrow, acuminate, 1-nerved, about equal, shorter than the floret; lemma strongly compressed, pubescent on the keel, firm, 3-nerved, the lateral nerves close to the margins. Perennials with creeping stolons or rhizomes, short blades, and several slender spikes digitate at the summit of the upright flowering culms. Species six, of which three are Australian, one species widely distributed in warmer regions.

1. **Cynodon dactylon** (L.) Pers. Syn. Pl. 1: 85. 1805. BERMUDA GRASS.
   Panicum dactylon L. Sp. Pl. 58. 1753.
   Capriola dactylon Kuntze, Rev. Gen. Pl. 2: 764. 1891.
   Low extensively creeping perennial with compressed wiry culms, narrow, usually short blades, and 3 to 5 slender arcuate-spreading spikes aggregate at the apex of the culms; spikelets about 2 mm. long.

   Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; common in open rather dry ground at low and medium altitudes. Warmer regions of both hemispheres, introduced in America. Type from Europe. Bahama grass, grama, grama de gallina, zacate agujilla, zacate conejo.

50. SPARTINA Schreb.; Gmel. Syst. Nat. ed. 13. 2: 123. 1791. CORDGRASS.

Spikelets 1-flowered, much flattened laterally, sessile and usually closely imbricate, on one side of a continuous rachis, disarticulating below the glumes, the rachilla not produced beyond the floret; glumes keeled, 1-nerved, acute or short-awned, the first shorter, the second often exceeding the lemma; lemma firm, keeled, the lateral nerves obscure, narrowed to a rather obtuse point; palea 2-nerved, keeled and flattened, the keel between or at one side of the nerves. Stout, erect, often tall perennials, with usually extensively creeping, firm, scaly rhizomes, long tough blades, and two to many appressed or sometimes spreading spikes racemose on the main axis. Species about 14, all North American except two or three along the coast of Europe, Africa, and South America.

1. **Spartina spartinae** (Trin.) Merr. U. S. Dept. Agr. Bur. Pl. Ind. Bull. 9: 11. 1902.
   Vilfa spartinae Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 4 [1]: 82. 1840.
   Spartina juncifórmis Engelm. & Gray, Journ. Bost. Soc. Nat. Hist. 5: 238. 1845.
   Spartina gouini Fourn. Mex. Pl. 2: 135. 1886.
   Spartina pitticri Hack. Oesterr. Bot. Zeitschr. 52: 237. 1902.
   Culms in dense hard clumps, 30 to 100 cm. tall, the rhizomes wanting; blades elongate, involute; panicles 10 to 20 cm. long, strict; spikes numerous, erect, mostly 2 to 3 cm. long; spikelets about 7 mm. long.

   Costa Rica (Puerto Limón); coral rock of seashore. Southern United States (the type from Texas), Mexico, and Costa Rica.

   A sterile specimen from Honduras (*Standley* 53802) may be S. PATENS JUNCEA (Michx.), Hitchc.

51. CTENIUM Panzer, Denkschr. Akad. Wiss. München 4: 288, 311, *pl. 13.* 1913
(*Campulosus* Desv. Nouv. Bull. Soc. Philom. Paris 2: 189. 1810)

Spikelets several-flowered but with only one perfect floret, sessile and closely imbricate, on one side of a continuous rachis, the rachilla disarticulating above the glumes; glumes unequal, the first small, hyaline, 1-nerved, the second as long as the lemmas, firm, 3 to 4 nerved, bearing on the back a strong divergent awn; lemmas rather papery, 3-nerved, villous on the lateral nerves and on the callus, bearing a short straight awn on the back just below the apex, the first and second lemmas empty, the third inclosing a perfect flower, the upper 1 to 3 empty and successively smaller. Erect, slender, rather tall perennials, with usually solitary, often curved spikes. Species about 12, in the warm regions, three being in the Eastern Hemisphere and the rest in America.

1. Ctenium planifolium (Presl) Kunth, Rév. Gram. 1: Suppl. XXII. 1830.
Campulosus planifolius Presl, Rel. Haenk. 1: 287. 1830.

Culms erect, hard and wiry, 40 to 100 cm. tall; lowermost sheaths becoming fibrous; blades flat; spike solitary, curved or flexuous, 5 to 15 cm. long; spikelets about 5 mm. long, the awns as long or longer, flexuous.

Panama (Picacho; Cerro Vaca); savannas, 350 to 1,000 meters. Also Mexico, whence the type.

52. MICROCHLOA R. Br. Prodr. Fl. Nov. Holl. 208. 1810

Spikelets 1-flowered, small, awnless, in a single slender 1-sided spike; rachilla disarticulating above the nearly equal, keeled glumes; lemma shorter than the glumes, hyaline, ciliate on the keel. Slender tufted perennials, with narrow blades and solitary falcate spikes. Species 3, two confined to Africa, one throughout the Tropics.

1. Microchloa indica (L. f.) Beauv. Ess. Agrost. Atlas 13. *pl. 20. f. 8.* 1812.
Nardus indicus L. f. Suppl. Pl. 105. 1781.
Microchloa setacea R. Br. Prodr. Fl. Nov. Holl. 208. 1810.

Low and tufted, mostly not more than 15 cm. tall; blades narrow, flat or folded; spikes slender, flexuous or falcate, usually less than 10 cm. long.

Guatemala (Santa Rosa, 1,000 meters); open ground. Mexico to Argentina. Type from India.

53. GYMNOPOGON Beauv. Ess. Agrost. 41. *pl. 9. f. 3.* 1812

Spikelets 1 or rarely 2 or 3 flowered, nearly sessile, appressed and usually remote in two rows along one side of a slender continuous rachis, the rachilla disarticulating above the glumes and prolonged behind the one or more fertile florets as a slender stipe, bearing a rudiment of a floret, this sometimes with one or two slender awns; glumes narrow, acuminate, 1-nerved, usually longer than the floret; lemmas narrow, 3-nerved, the lateral nerves near the margin, the apex minutely bifid, bearing between the teeth a slender awn, or rarely awnless. Perennials or rarely annuals, with short, flat, stiff blades, numerous stiff, slender, divergent spikes loosely scattered along the upper part of the culm, or sometimes aggregate toward the summit, the spikes often deflexed at maturity. Species 10, nearly all American.

Spikelets 2-flowered ..... 1. G. aristiglumis.
Spikelets 1-flowered ..... 2. G. fastigiatus.

1. Gymnopogon aristiglumis Hitchc. Proc. Biol. Soc. Washington 40: 82. 1927.

Perennial; culms ascending from a decumbent base, hard and wiry, glabrous, 80 to 100 cm. long, many-noded, the lower part clothed with bladeless or nearly

bladeless sheaths; blades rather stiffly diverging, flat, glabrous on both surfaces, the larger ones 5 to 8 cm. long, 5 to 10 mm. wide; panicles of several very slender soft racemes 20 to 35 cm. long, along an axis 15 to 20 cm. long, the rachises pilose at the base, very scabrous; spikelets mostly 2-flowered with a rudiment of a third floret, distant on the lower part of the rachis, approximate above, the pedicels slender, 1 to 2 mm. long; glumes 2 and 3 mm. long, gradually narrowed to a slender straight scabrous awn about 1 cm. long; first lemma narrow, the awn 1 to 2 cm. long; second lemma similar but a little smaller, the rudiment about two-thirds as long as the lemma, jointed at apex and bearing an awn nearly as long as that of the lemma.

El Salvador (Rosario, the type, and San Salvador); open grassy slopes at medium altitudes.

This species differs from *G. spicatus* (Spreng.) Kuntze in the larger blades, panicles, and spikelets, and especially in the long-awned glumes.

2. Gymnopogon fastigiatus Nees, Agrost. Bras. 430. 1829.

Monochaete fastigiata Doell in Mart. Fl. Bras. 2[3]: 79. 1878.

Tufted perennial with slender culms 30 to 60 cm. tall, rather stiff flat or loosely involute blades 1 to 3 cm. long and 1 to 3 mm. wide, and several slender ascending racemes 2 to 7 cm. long on an axis 1 to 4 cm. long; spikelet 1-flowered with a prolongation of the rachilla; second glume narrow, 3 mm. long; lemma a little less than 2 mm. long, the flexuous awn about 1 cm. long; rudiment appressed between the keels of the palea.

Costa Rica (Boruca); Panama (Olá); savannas and open woods. Costa Rica to Brazil, whence the type.

Doell distinguished the genus *Monochaete* from *Gymnopogon* by the absence of a rudiment. The rudiment is present, however, but is hidden between the keels of the palea.

54. CHLORIS Swartz, Prodr. Veg. Ind. Occ. 25. 1788

Spikelets with 1 perfect floret, sessile, in two rows along one side of a continuous rachis, the rachilla disarticulating above the glumes, produced beyond the perfect floret and bearing 1 to several reduced florets consisting of empty lemmas, these often truncate, and, if more than one, the smaller ones inclosed in the lower, forming a usually club-shaped rudiment; glumes somewhat unequal, the first shorter, narrow, acute; lemma keeled, usual broad, 1 to 5 nerved, often villous on the callus and villous or long-ciliate on the keel or marginal nerves, awned from between the short teeth of a bifid apex, the awn slender or sometimes reduced to a mucro, the sterile lemmas awned or awnless. Tufted perennials or sometimes annuals with flat blades and two to several often showy and feathery spikes aggregate at the summit of the culms. Species about 60, in the warmer regions.

Lemmas awnless; spikes dark brown (Section EUSTACHYS)_____1. C. petraea.
Lemmas awned.
  Plants perennial, more or less stoloniferous.
    Culms 1 to 1.5 meters tall, sometimes shorter, the stolons elongate; awns 2 to 3 mm. long_____2. C. gayana.
    Culms 30 to 50 cm. tall, the stolons short; awn about 1 cm. long.
      3. C. orthonoton.
  Plants annual.
    Rudiment narrow, acutish_____4. C. radiata.
    Rudiment truncate.
      Awn of fertile lemma 1 to 1.5 mm. long_____7. C. ciliata.

Awn of fertile lemma 5 to 8 mm. long.
Sterile floret 1, the lemma gradually widened upward____5. C. virgata.
Sterile florets 2 (rudiment), the lemmas triangular-truncate.
6. C. inflata.

1. Chloris petraea Swartz, Prodr. Veg. Ind. Occ. 25. 1788.
Eustachys petraea Desv. Nouv. Bull. Soc. Philom. Paris 2: 189. 1810.

Glabrous glaucous sparingly stoloniferous perennial; culms flat, ascending; sheaths keeled, often in pairs, especially in robust plants; blades flat, thickish oblong or linear, obtuse; spikes few to several, the rachis and glumes pale green, the florets chestnut; spikelets 2 mm. long; second glume bilobed, the midnerve excurrent as a short awn; lemma awnless, a little exceeding the second glume.

Honduras, Costa Rica, Panama; vicinity of the seashore, Atlantic side. Southern United States and the West Indies to Panama. Type from Jamaica.

2. Chloris gayana Kunth, Rév. Gram. 1: 89. 1829: 2: 293. *pl.* 58. 1830.

RHODES GRASS.

Stout perennial, with creeping stolons or runners a meter or more long; culms flat, 1 to 1.5 meters tall; blades flat, 4 to 8 mm. wide; spikes several to numerous, 5 to 10 cm. long; lemma about 3 mm. long, the awn 2 to 3 mm. long.

Guatemala, El Salvador, cultivated and sometimes escaped. A native of Africa, cultivated in warm countries for forage, at low and medium altitudes. Zacate gordura.

3. Chloris orthonoton Doell in Mart. Fl. Bras. 2[3]: 64. 1878.

Sparingly stoloniferous perennial, grayish; culms flat, commonly 40 to 60 cm. tall; sheaths compressed, hairy in the throat; blades flat or folded, about 5 mm. wide, scabrous on the upper surface; spikes 4 to 9, ascending, somewhat flexuous; second glume and lemma about 3 mm. long, the awn about 1 cm. long.

Guatemala, Costa Rica; grassy banks, pastures, and waste places. Mexico to Brazil, whence the type.

4. Chloris radiata (L.) Swartz, Prodr. Veg. Ind. Occ. 26. 1788.
Agrostis radiata L. Syst. Nat. ed. 10. 2: 873. 1759.

Weedy branching decumbent-ascending annual; sheaths broad, compressed; blades thin, flat or folded, scaberulous or sparsely pilose; spikes slender, somewhat flexuous; second glume narrow, awn-pointed, 2 mm. long; lemma narrow, 2.5 mm. long, the awn 5 to 10 mm. long; rudiment narrow, scarcely 1 mm. long, diverging a little from the fertile lemma and not as long as this, the awn as much as 5 mm. long.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; a common weed in open ground and waste places at low altitudes. Mexico and the West Indies to Paraguay. Type from Jamaica.

5. Chloris virgata Swartz, Fl. Ind. Occ. 1: 203. 1797.
Chloris elegans H. B. K. Nov. Gen. & Sp. 1: 166. *pl. 49*. 1816.

Culms ascending, 20 to 40 cm. tall, scarcely compressed, the upper sheaths slightly inflated, glabrous in the throat; spikes mostly 5 or 6, suberect, somewhat flexuous in age, 3 to 5 cm. long; fertile lemma 3 mm. long, broadest above the middle, villous on the keel to a little below the summit, and long pilose on the margins near the tip, the awn 5 to 8 mm. long; rudiment a little more than 2 mm. long, gradually broadened to an oblique truncate apex, the awn somewhat shorter than that of the fertile lemma.

Guatemala, Honduras, El Salvador, Nicaragua, Panama; a weed in open ground, fields, and waste places at low and medium altitudes. Mexico and the West Indies to Argentina. Type from Antigua.

6. **Chloris inflata** Link. Enum. Pl. 1: 105. 1821.

Andropogon barbatum L. Mant. Pl. 2: 302. 1771. Not *A. barbatum* L. 1759.
Chloris barbata, Swartz, Fl. Ind. Occ. 1: 200. 1797.
Chloris paraguaiensis Steud. Syn. Pl. Glum. 1: 204. 1854.

Tufted annual, 30 to 75 cm. tall; culms and sheaths strongly compressed; blades long, lax; spikes about 10, usually flexuous, commonly purplish-tinged, 4 to 6 cm. long; first lemma 2 mm. long, the awn about 6 mm. long; rudiment of 2 triangular-obtuse lemmas about 1 mm. long, the awn of the first about as long as that of the fertile lemma, the awn of the second short.

Honduras, Panama; a common weed in waste places at low altitudes. Mexico and the West Indies to Argentina. Type grown in the Berlin Botanic Garden from seed said to come from "California," obviously an error.

7. **Chloris ciliata** Swartz, Prodr. Veg. Ind. Occ. 25. 1788.

Erect or spreading annual; culms 30 to 60 cm. tall or sometimes taller; blades flat, as much as 5 mm. wide; spikes pale, 4 to 6, strongly flexuous, 3 to 6 cm. long, the florets conspicuously silky-ciliate; fertile lemma about 2.5 mm. long, strongly ciliate on the keel and marginal nerves, the awn 1 to 1.5 mm. long; rudiment of 2 or 3 sterile lemmas, triangular-truncate, not longer than the fertile lemma, awnless.

Nicaragua (Vulcan El Viejo); open ground and waste places. Texas and the West Indies to South America. Type from Jamaica.

55. BOUTELOUA Lag. Var. Cienc. 2[4]: 134. 1805. GRAMA

Spikelets 1-flowered, with the rudiments of one or more florets above, sessile, in two rows along one side of the rachis; glumes unequal, 1-nerved, acuminate or awn-tipped, the first shorter and narrower; lemma as long as the second glume or a little longer, 3-nerved, the nerves extending into short or often rather long awns, the internerves usually extending into teeth; palea 2-nerved, sometimes 2-awned; rudiment various, usually 3-awned, a second rudimentary floret sometimes present. Perennials or sometimes annuals, with few to many spikes racemose on a common axis, or sometimes solitary, the spikelets few to many in each spike, rarely solitary, pectinate or more loosely arranged and appressed, the rachis of the spike usually produced beyond the insertion of the spikelets. Species 38, all American and chiefly North American.

Spikes mostly 20 to 60, on an elongate axis.
  Perennial; culms erect ..... 1. B. curtipendula.
  Annual; culms straggling ..... 2. B. pilosa.
Spikes mostly less than 10.
  Spikes densely pubescent, the awns inconspicuous ..... 3. B. chondrosioides.
  Spikes not densely pubescent, the awns exserted.
    Peduncle of spike turbinate, about 1 mm. long; annual ..... 4. B. alamosana.
    Peduncle of spike slender, 2 mm. long or more; perennial.
      Spikes slender, about 2 cm. long, 2 to 3 mm. wide ..... 5. B. americana.
      Spikes stout, 1.5 to 2 cm. long, 5 to 8 mm. wide.
        Culms decumbent or creeping at base; spikes horizontally spreading ..... 6. B. repens.

Culms erect or somewhat decumbent; spikes ascending or appressed.
Blades glabrous to papillose-pilose_____7. B. filiformis.
Blades velvety-pubescent_____8. B. pubescens.

1. Bouteloua curtipendula (Michx.) Torr. in Emory, Mil. Reconn. 154. 1848.
Chloris curtipendula Michx. Fl. Bor. Amer. 1: 59. 1803.
Bouteloua racemosa Lag. Var. Cienc. 2[4]: 141. 1805.
Atheropogon curtipendulus Fourn. Mex. Pl. 2: 138. 1886.
Atheropogon medius Fourn. Mex. Pl. 2: 139. 1886.

Erect perennial; culms cespitose, 50 to 80 cm. tall; blades flat, 3 to 5 mm. wide; raceme of spikes 15 to 25 cm. long; spikes 35 to 50, spreading or deflexed, 1 to 2 cm. long; spikelets 5 to 8; glumes about 4 and 7 mm. long; sterile lemma 5 to 6 mm. long, 3-awned, the central awn longer.

Guatemala (Naranjo); El Salvador; dry grassy hills, up to 1,000 meters. United States (type from Illinois) to Argentina.

2. Bouteloua pilosa (Hook. f.) Benth.; S. Wats. Proc. Amer. Acad. 18: 179. 1883.
Eutriana pilosa Hook. f. Trans. Linn. Soc. Bot. 20: 173. 1851.

Branching, spreading, straggling annual; culms 20 to 60 cm. long; blades flat; spikes 15 to 40, spreading or deflexed, 4 to 7 mm. long (excluding awns); spikelets mostly 2 to 4, the awns nearly wanting or as much as 5 mm. long.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; savannas and brushy slopes, at low altitudes, Pacific side. Guatemala to Peru. Type from Galápagos Islands.

This species is closely allied to *B. disticha* (H. B. K.) Benth, of the West Indies, differing from that in the more numerous, and smaller spikelets with shorter awns.

3. Bouteloua chondrosioides (H. B. K.) Benth.; S. Wats. Proc. Amer. Acad. 18: 179. 1883.
Dinebra chondrosioides H. B. K. Nov. Gen. & Sp. 1: 173. *pl. 53*. 1816.
Chondrosium humboldtianum Kunth, Rév. Gram. 1: 93. 1829.

Stout erect or spreading cespitose perennial, with leafy base and comparatively naked culms 20 to 40 cm. tall; blades flat, 2 to 3 mm. wide; spikes 4 to 6, 1 to 1.5 cm. long, densely pubescent, approximate in a raceme about 4 cm. long, the awns inconspicuous.

Costa Rica (Nicoya, 150 meters), grassy plains and hills. Southwestern United States to Costa Rica. Type from Mexico.

4. Bouteloua alamosana Vasey, Contr. U. S. Nat. Herb. 1: 115. 1891.

Annual; culms ascending from a spreading or creeping base, 20 to 60 cm. long; blades mostly 1 to 2 mm. wide, glabrous or papillose-pilose; spikes mostly 5 to 8, 6 to 8 mm. long (excluding awns), horizontally spreading, the axis 3 to 4 cm. long; peduncle of spikes turbinate, densely pubescent, about 1 mm. long; spikelets mostly 3, approximate on the lower part of the rachis; glumes pilose along the keel, about equal; florets 2 with a bristle-like prolongation of the rachilla; awns about 1 cm. long.

Honduras, El Salvador, Nicaragua, Costa Rica, sandy open ground near the coast (Pacific side). Mexico to Costa Rica, the type from Alamos, Sonora.

5. Bouteloua americana (L.) Scribn. Proc. Acad. Phila. 1891: 306. 1891.
Aristida americana L. Syst. Nat. ed. 10. 2: 879. 1759.
Atheropogon americanus Fourn. Mex. Pl. 2: 139. 1886.

Perennial, mostly prostrate-spreading; culms branching, 30 to 60 cm. long; blades flat or loosely involute, 2 to 3 mm. wide; spikes 3 to 7, about 2 cm. long;

glumes 3 and 4 mm. long; lemma 3-awned, the central awn 3 mm. long, the lateral 1 mm.; rudiment with 3 awns about 1 cm. long.

Honduras, El Salvador, Nicaragua, Costa Rica, Panama; savannas, grassy hills and open ground at low altitudes. Central America and the West Indies to Venezuela and British Guiana. Type from Jamaica.

6. **Bouteloua repens** (H. B. K.) Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 24: 26. 1901.

Dinebra repens H. B. K. Nov. Gen. & Sp. 1: 172. *pl. 52.* 1816.

Perennial; culms ascending from a decumbent or creeping base, 30 to 100 cm. long; blades 1.5 to 3 mm. wide, papillose-ciliate or glabrous; spikes 4 to 8, mostly spreading, about 1.5 cm. long (excluding awns), 5 to 8 mm. wide; spikelets usually 4 to 8; lemma about 7 mm. long 3-awned; second floret (the rudiment), with 3 awns about 7 mm. long.

Guatemala, El Salvador, Nicaragua, Costa Rica, Panama, sandy open ground near the coast, (Pacific side). Mexico to Panama, the type from Acapulco.

7. **Bouteloua filiformis** (Fourn.) Griffiths, Contr. U. S. Nat. Herb. 14: 413. 1912.

Atheropogon filiformis Fourn. Mex. Pl. 2: 140. 1886.

Differs from *B. repens* to which it is closely allied, in the usually more erect culms and the ascending or appressed spikes.

Guatemala, prairies and grassland at medium altitudes. Southwestern United States to Guatemala, the type from Mexico.

8. **Bouteloua pubescens** Pilger, Verh. Bot. Ver. Brand. 51: 193. 1909.

Differs from *B. filiformis* in having densely pubescent blades.

Doctor Pilger has kindly sent a fragment of the type of this species (Guatemala, *Seler* 3234), the only collection known.

56. CATHESTECUM Presl, Rel. Haenk. 1: 294. *pl. 42.* 1830

Spikes consisting of 3 spikelets, the upper or central perfect, the 2 lateral staminate or rudimentary, the spike falling entire; central spikelet with one perfect floret below and one or more reduced florets above; glumes unequal, the first a short, thin, nerveless scale in the central spikelet, narrow and acuminate in the lateral spikelets, the second about as long as the lemma, acuminate; lemma 3-nerved, or rarely 5 to 7 nerved, the nerves extending into awns and the internerves into teeth; palea 2-nerved, the nerves extending into short awns; second and third florets with fairly well-developed lemmas and paleas, the fourth floret reduced or obsolete. Low cespitose or stoloniferous annuals or perennials, with short blades, and several or many short deciduous spikes scattered along the main axis. Species four, on the Mexican Plateau, one extending into western Texas.

1. **Cathestecum stoloniferum** (Fourn.) Griffiths, Contr. U. S. Nat. Herb. 14: 362. *f. 26.* 1912.

Atheropogon stolonifer Fourn. Mex. Pl. 2: 140. 1886.

Low, creeping, stoloniferous perennial, forming at times a moderate turf; culms erect or geniculate, 10 to 15 cm. tall, the stolons bearing small tufts of leaves at intervals of 8 to 10 cm.; spikes 4 to 6, triangular in outline and about 13 mm. long; upper spikelet with densely hairy glumes, the first minute, fan-shaped, the second acuminate, awn-tipped; fertile lemma pubescent and bearing 8 short awns; sterile lemmas usually 3, deeply lobed, glabrous, and with 3 prominent scabrous awns; lower spiklets with densely hairy pointed glumes, the first about half as long as the second; lower lemma as in the perfect spikelet; sterile lemma similar to those of the perfect spikelet, but the awns pilose.

El Salvador (La Unión); open grassy flats. Also Mexico, the type from Oaxaca.

57. PENTARRHAPHIS H. B. K. Nov. Gen. & Sp. 1: 177. *pl. 60.* 1816

Spikes small, woolly, consisting of 2 spikelets, one of these sometimes aborted, approximate on a rachis ending in a forked or bifid prolongation; first glume of each spikelet reduced to scarcely more than a straight awn, these together with the bifid rachis appearing like a cluster of awns at the base of the spikelet; spikelets 2-flowered. Cespitose perennials with narrow mostly basal blades and several short nearly sessile spikes along a slender axis. Species 2, Mexico to Colombia.

1. **Pentarrhaphis scabra** H. B. K. Nov. Gen. & Sp. 1: 178. *pl. 60.* 1816.
   Polyschistis paupercula Presl, Rel. Haenk. 1: 294, *pl. 41. f. 12.* 1830.

Erect, cespitose perennial about 30 cm. high; raceme of spikes loose, 4 to 5 cm. long, the rachis zigzag; spikes about 12, 8 mm. long, including the awns, consisting of one perfect, 2-flowered spikelet and a cluster of 5 awns below; 2 of these united at base representing the continuation of the rachis, one slightly expanded representing the first glume of the perfect spikelet, the other two representing the aborted lower spikelet, all, together with the upper glume, densely white-hairy; lemma of the first floret, including awns, about 6 mm. long and of the second floret about 7 mm. long, both sparingly hairy.

Guatemala; rocky soil, 1,000 to 1,500 meters. Mexico, whence the type, to Colombia.

58. HIEROCHLOË R. Br. Prodr. Fl. Nov. Holl. 208. 1810
(*Torresia* Ruiz & Pav., Syst. Veg. Peruv. Chil. 251. 1798)

Spikelets with one terminal perfect floret and two staminate florets, disarticulating above the glumes, the staminate florets falling attached to the fertile one; glumes equal, broad, thin and papery, smooth, acute; sterile lemmas about as long as the glumes, mostly somewhat appressed-hispid, sometimes awned from between two lobes; fertile lemma somewhat indurate, about as long as the others, smooth or nearly so, awnless; palea 3-nerved, rounded on the back. Erect, sweet-smelling perennials with small panicles of bronze-colored spikelets. Species about 17, confined to cool and alpine regions.

1. **Hierochloë mexicana** (Rupr.) Benth.
   Ataxia mexicana Rupr.; Fourn. Mex. Pl. **2**: 71. 1886.
   Savastana mexicana Beal, Grasses N. Amer. **2**: 187. 1896.
   Hierochloë mexicana Benth.; Beal, Grasses N. Amer. **2**: 187. 1896, as synonym.
   Torresia mexicana Hitchc. Amer. Journ. Bot. **2**: 301. 1915.

Culms 30 to 60 cm. tall; blades flat, 2 to 5 mm. wide; panicles narrow, 5 to 15 cm. long, the branches appressed; first glume about 5 mm. long, 1-nerved; second glume 6 to 7 mm. long, 3-nerved; sterile florets bronze, 4 to 5 mm. long, pubescent, the first with a short straight awn attached near the tip, the second with a geniculate twisted awn attached near the base, exserted about 4 mm.; fertile floret smooth, brown, lanceolate-acute, 3 mm. long, awnless.

Guatemala (Volcán de Agua, 3,000 meters); dry slopes. Also Mexico, the type from Oaxaca.

59. ANTHOXANTHUM L. Sp. Pl. 28. 1753

Spikelets with 1 terminal perfect floret and 2 sterile lemmas, the rachilla disarticulating above the glumes, the sterile lemmas falling attached to the fertile floret; glumes unequal, acute or mucronate; sterile lemmas shorter than the glumes, empty, awned from the back; fertile lemma shorter than the sterile ones, awnless; palea 1-nerved, rounded on the back, inclosed in the lemma.

Sweet-smelling annuals or perennials, with flat blades and spikelike panicles. Species about four, Europe and Asia.

1. **Anthoxanthum odoratum** L. Sp. Pl. 28. 1753. SWEET VERNAL GRASS.

Tufted fragrant perennial with flat blades and loosely spikelike panicles commonly about 5 cm. long.

Costa Rica; cultivated and escaped in pastures and grassland at 1,500 to 2,500 meters, introduced from Europe into temperate regions of America.

PHALARIS ARUNDINACEA L. Sp. Pl. 55. 1753 REED CANARY GRASS.

A variegated form of this, variety *picta*, is sometimes grown in gardens for ornament. It has leaves striped with white. Called zacate listón, gardener's garters, ribbon grass.

60. ORYZA L. Sp. Pl. 333. 1753. RICE

Spikelets 1-flowered, laterally compressed, disarticulating below the glumes; glumes 2, much shorter than the lemma, narrow; lemma rigid, keeled, 3-nerved, sometimes awned; palea similar to the lemma, narrower, keeled, but with no midnerve on the back, 2-nerved close to the margins. Annual or sometimes perennial swamp grasses, often tall, with flat blades, and spikelets in open panicles. Species about seven, one in tropical America, the others in tropical Africa and Asia.

Plants annual ..... 1. O. sativa.
Plants perennial ..... 2. O. latifolia.

1. **Oryza sativa** L. Sp. Pl. 333. 1753. RICE.

Erect annual up to a meter or more in height; blades flat, as much as 1.5 cm. wide; panicles rather compact, many-flowered, drooping when large or heavy with fruit; spikelets oblong, 7 to 10 mm. long; glumes 2 to 3 mm. long; lemma hard, ridged by the lateral nerves, more or less hispidulous, the awn variable, several centimeters long or wanting.

Cultivated and more or less persistent in fields and ditches. Arroz.

2. **Oryza latifolia** Desv. Journ. de Bot. Desv. 1: 77. 1813.

Oryza sativa latifolia Doell in Mart. Fl. Bras. 2^2: 7. 1871.

Rather robust perennial; culms 2 meters or more tall; blades thin, flat, scabrous, commonly 50 to 60 cm. long and 4 to 5 cm. wide; panicles large many-flowered; spikelets about 5 mm. long, the erect awn 10 to 15 mm. long short-pediceled along the upper half to two-thirds of the long slender ascending branches.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; swamps, ditches and wet places. Guatemala and the West Indies to Brazil. Type from Porto Rico.

61. LEERSIA Swartz, Prodr. Veg. Ind. Occ. 21. 1788

Homalocenchrus Mieg. Act. Helv. Phys-Math. 4: 307. 1760 (inadequately published)

Spikelets 1-flowered, strongly compressed laterally, disarticulating from the pedicel; glumes wanting; lemma chartaceous, broad, oblong, boat-shaped, usually 5-nerved, the lateral pair of nerves close to the margins, the intermediate nerves sometimes faint; palea as long as the lemma, much narrower, usually 3-nerved, the lateral nerves close to the margins, the margins firmly held by the margins

of the lemma; stamens six or fewer. Perennials, usually with creeping rhizomes, flat scabrous blades, and open panicles, the spikelets nearly sessile along one side of the branchlets. Species 10, tropical and temperate regions.

Panicle contracted, the branches ascending, spikelet-bearing from near the base; spikelets hispid ..... 1. L. hexandra.
Panicle open, the branches slender, spreading, naked below; spikelets smooth or sparsely hispidulous ..... 2. L. grandiflora.

1. **Leersia hexandra** Swartz, Prodr. Veg. Ind. Occ. 21. 1788.
Oryza hexandra Doell in Mart. Fl. Bras. **2**[2]: 10. 1871.
Homalocenchrus hexandrus Kuntze, Rev. Gen. Pl. **2**: 777, 1891.

Scabrous aquatic perennial, the slender culms often 2 meters tall, erect from a creeping base, the flat blades mostly 15 to 20 cm. long and about 8 mm. wide, the many-flowered panicle pale or purplish. Extensively creeping stolons with short blades are sometimes produced in land bordering ponds and ditches.

Guatemala, Honduras, Nicaragua, Costa Rica, Panama; swamps and wet places at low and medium altitudes. Southern United States and the West Indies to Argentina. Type from Jamica.

2. **Leersia grandiflora** (Doell) Prodoehl, Bot. Archiv Mez 1: 219. 1922.
Oryza monandra var. grandiflora Doell in Mart. Fl. Bras. **2**[2]: 9. 1871.
Homalocenchrus grandiflorus Hitchc. Contr. U. S. Nat. Herb. **17**: 273. 1913.

Culms erect, without rhizomes, 1 to 2 meters tall; blades 1 to 2 cm. wide; panicles large and open, the slender branches about 15 cm. long; spikelets 2 to 2.5 mm. long.

Costa Rica, Panama; shady banks and borders of streams, at medium altitudes. Mexico to Brazil, whence the type.

62. LUZIOLA Juss.; Gmel. Syst. Nat. ed. 13. 2: 637. 1791

Spikelets unisexual, 1-flowered, disarticulating from the pedicel, the staminate and pistillate flowers in separate panicles on the same plant; first glume and palea wanting; second glume and lemma about equal, thin, several to many nerved, lanceolate or oblong; stamens several ("6 to 18"); stigmas long, plumose; grain free, globose, smooth. Low creeping perennials, or annuals, with narrow, flat blades and terminal and axillary panicles. Species about six, in tropical America.

1. **Luziola peruviana** Gmel. Syst. Nat. ed. 13. 2: 637. 1791.

More or less decumbent, spreading, apparently annual; culms 10 to 30 cm. long, blades flat, 1 to 2 mm. wide; panicles spreading, 2 to 3 cm. long; pistillate spikelets 2 to 3 mm. long, with striate glume and lemma; fruit globose, smooth, a little more than 1 mm. long; staminate spikelets 5 mm. long.

Guatemala; swamps and shallow water, at about 1,400 meters altitude. Southern United States and Cuba to Uruguay and Peru, whence the type.

63. PHARUS L. Syst. Nat. ed. 10. 2: 1269. 1759

Spikelets 1-flowered, unisexual, in pairs appressed along the main branches of the inflorescence, 1-pistillate and sessile, the other staminate and long-pediceled; pistillate spikelet terete; glumes about equal, membranaceous, several-nerved; lemma rather thin in anthesis but becoming indurate in fruit, longer than the glumes, with a minute bent beak, the back clothed to a varying degree with thickly set unciņate hairs, these becoming adhesive organs in fruit, the edges sharply folded inward and the whole lemma becoming involute in fruit; palea very narrow, as long as the lemma, 2-nerved, membranaceous,

folded around the long style; stigmas 3; staminate spikelet laterally compressed on a stiff pedicel as long as the pistillate spikelet; glumes thin, the first shorter, 1-nerved, the second 3-nerved; lemma as long as the second glume; stamens 6. Erect perennials (the base sometimes decumbent) with broad flat blades and open panicles, the blades with fine transverse veins between the longitudinal nerves, petioled (the petiole with a single twist reversing the upper and under surfaces of the blade), the nerves running obliquely from midrib to margin. Species about 6, tropical America.

Fruit 2 to 2.5 cm. long, 4 to 5 times as long as the glumes_____1. P. cornutus
Fruit 8 to 15 mm. long, not more than twice as long as the glumes.
  Fruit pubescent only near the summit_____2. P. latifolius.
  Fruit pubescent nearly all over.
    Culms erect_____3. P. glaber.
    Culms decumbent and rooting at base_____4. P. parvifolius.

1. **Pharus cornutus** Hack. Oesterr. Bot. Zeitschr. 52: 9. 1902.

Culms 30 to 50 cm. tall; blades obovate to oblanceolate, mostly less than 12 cm. long, 3 to 5 cm. wide; panicles 10 to 15 cm. long, the lower pairs of spikelets more or less pediceled on the spreading branches; glumes of fertile spikelet 3 to 5 mm. long, fruit spreading, 2 to 2.5 cm. long, slender, elongate S-shaped from short curves at each end, densely pubescent toward apex, sparsely so below.

Costa Rica; wet forest, 200 to 500 meters altitude. Type from Tsâki, Talamanca.

2. **Pharus latifolius** L. Syst. Nat. ed. 10. 2: 1269. 1759.

Similar to *P. glaber*, the blades on the average broader, the fruits longer, tapering at the summit, pubescent only near the tip.

Guatemala, Honduras, Costa Rica, Panama; wet forest at low altitudes. Guatemala and the West Indies to Brazil. Type from Jamaica.

3. **Pharus glaber** H. B. K. Nov. Gen. & Sp. 1: 196. 1816.

Pharus mezii Prodoehl, Bot. Archiv Mez 1: 250. 1922.

Erect glabrous perennial 50 to 75 cm. tall; blades oblanceolate, acuminate, commonly 15 to 25 cm. long and 3 to 5 cm. wide; panicles large, open, fragile, the few branches stiffly ascending or spreading, the appressed oblong brown spikelets about 1 cm. long; fruit densely clothed with hooked hairs, the panicles readily breaking up, the pieces attaching themselves by the hooked hairs to passing objects.

Guatemala, Honduras, El Salvador, Costa Rica, Panama; wet forest at low and medium altitudes. Mexico and the West Indies to Brazil. Type from Venezuela.

4. **Pharus parvifolius** Nash, Bull. Torrey Club 35: 301, 1908.

Resembling *P. glaber;* base creeping and rooting; blades on the average narrower.

Honduras, Costa Rica; wet forest at low altitudes. Mexico and the West Indies to Brazil. Type from Haiti.

64. MELINIS Beauv. Ess. Agrost. 54. *pl. 11. f. 4.* 1812

Spikelets 1-flowered with a sterile lemma below as in *Panicum*, disarticulating from the short slender pedicels; first glume very small, the second about equaling the sterile lemma, 2-lobed at apex, mucronate between the lobes, nerved; sterile lemma similar to the second glume, the awn straight, long and slender; fertile lemma and palea whitish, somewhat cartilaginous, shorter than the sterile lemma, awnless; palea a little shorter than its lemma. A spreading

branching perennial with small spikelets in panicles. A single species in America; about 14 species have been described from Africa.

1. **Melinis minutiflora** Beauv. Ess. Agrost. 54 *pl. 11. f. 4.* 1812. MOLASSES GRASS.

Glandular throughout; culms a meter or more long, rooting at the lower nodes, pubescent especially about the nodes; sheaths pilose; blades pubescent, 10 to 15 cm. long, 5 to 10 mm. wide; panicle 15 to 20 cm. long, dark purple, rather closely flowered, the branches ascending; spikelets about 2 mm. long, the straight delicate awn about 1 cm. long. When fresh the plant emits a sweetish pungent odor. Zacate gordura.

Guatemala, Honduras, El Salvador, Costa Rica. Cultivated for forage. Described from Brazil where, however, it appears to be introduced. Native of Africa.

65. ARUNDINELLA Raddi, Agrost. Bras. 36. *pl. 1. f. 3.* 1823

Spikelets short-pedicellate in large panicles; glumes acuminate, the tips spreading, the second longer than the first and the sterile lemma; fertile lemma minute, bearded on the callus, bearing a long slender awn from the apex. About 25 species in the Tropics of Asia and America.

Awn tightly twisted below, geniculate.

Awn little exserted, 1 to 2 mm. long, the lower twisted part about as long as the sterile lemma ..... 1. A. hispida.

Awn as much as 1 cm. long, the lower twisted part about 4 mm. long, exserted from the spikelet ..... 2. A. confinis.

Awn loosely twisted below, the bend arcuate rather than geniculate.

Culm stout, 1.5 to 2 meters tall; sheaths appressed-hispid; blades mostly more than 1 cm. wide ..... 3. A. deppeana.

Culm slender, mostly 0.5 to 1 meter tall; sheaths glabrous; blades mostly less than 1 cm. wide ..... 4. A. berteroniana.

1. **Arundinella hispida** (Humb. & Bonpl.) Kuntze, Rev. Gen. Pl. 2: 761. 1891.

Andropogon hispidus Humb. & Bonpl.; Willd. Sp. Pl. 4: 908. 1806.

Arundinella brasiliensis Raddi, Agrost. Bras. 37, 1823.

Tall reedlike perennial; sheaths and blades hispid; panicles condensed, 5 to 15 cm. long, the numerous branches ascending, 4 to 6 cm. long; spikelets about 3 mm. long, the awn geniculate and twisted, exserted 1 to 2 mm. at one side.

Panama (El Boquete); wet meadows. Panama to Argentina. Type from Brazil.

2. **Arundinella confinis** (Schult.) Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 290. 1917.

Piptatherum confine Schult. Mant. 2: 184. 1824.

Arundinella martinicensis Trin. Gram. Pan. 62 1826.

Arundinella pallida Nees, Agrost. Bras. 465. 1829.

Tufted erect perennial; culms strong, slender, up to 2.5 meters tall; blades flat, scabrous at least on the upper surface; panicles oblong, rather densely flowered, 20 to 40 cm. long.

Costa Rica, Panama; grassy slopes. Southern Mexico and the West Indies to Paraguay. Type from Martinique.

3. **Arundinella deppeana** Nees in Steud, Syn. Pl. Glum 1: 115. 1854.

Arundinella phragmitoides Griseb. Cat. Pl. Cuba 234. 1866.

Culms erect, as much as 2.5 meters tall; sheaths appressed-pilose, especially toward summit; blades flat, as much as 2.5 cm. wide; panicle as much as 70 cm. long, the branches ascending, very numerous, closely overlapping, mostly

10 to 15 cm. long; spikelets approximate on the branches, overlapping, 4 to 5 mm. long; awn about 1 cm. long.

Guatemala, British Honduras, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; savannas, grassy banks, and dry hills. Mexico, whence the type, and the West Indies to Brazil.

4. **Arundinella berteroniana** (Schult.) Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 290. 1917.

Trichochloa berteroniana Schult. Mant. 2: 209. 1824.

Arundinella peruviana Steud. Syn. Pl. Glum. 1: 115. 1854.

Arundinella cubensis Griseb. Mem. Acad. n. ser. 8: 533. 1862.

Smaller and more slender than *A. deppeana;* blades often folded or involute, usually less than 5 mm. wide; panicle less dense and fewer flowered.

Guatemala, Honduras, El. Salvador, Costa Rica, Panama; rocky river banks. Mexico and the West Indies to Brazil. Type from Santo Domingo.

66. LEPTOCORYPHIUM Nees, Agrost. Bras. 83. 1829

Spikelets lanceolate, 1-flowered with a sterile lemma below; first glume obsolete; second glume and sterile lemma 3 and 5 nerved, the latter a little longer than the former and about as long as the fruit; fertile lemma slightly cartilaginous-indurate, chestnut with a white delicate hyaline summit; palea not inclosed above, the 2 nerves obscurely visible. Erect caspitose perennials with narrow blades and narrow panicles. Species one or two in tropical America.

1. **Leptocoryphium lanatum** (H. B. K.) Nees, Agrost. Bras. 84. 1829.

Paspalum lanatum H. B. K. Nov. Gen. & Sp. 1: 94. *pl. 29.* 1816.

Anthaenantia lanata Benth. Journ. Linn. Soc. Bot. 19: 39. 1881.

Slender erect tufted perennial up to 1 meter tall; blades long, narrow, often involute; panicles oblong, loose, many-flowered, pale, the branchlets capillary; spikelets silky-pilose, the hairs at first appressed, at maturity spreading.

Guatemala, British Honduras, Honduras, Costa Rica, Panama; dry hills, grassy plains, and pine barrens, mostly below 1,000 meters. Mexico, whence the type, and West Indies to Argentina.

67. TRICHACHNE Nees, Agrost. Bras. 85. 1829

(*Valota* Adans. Fam. Pl. 2: 495. 1763. This name is rejected as being ineffectively published, there being no species mentioned, though it is associable by citation with *Andropogon insularis* L.)

Spikelets lanceolate, in pairs, short-pediceled, in two rows along one side of a narrow rachis; first glume minute, glabrous; second glume and sterile lemma about as long as the fruit, 3 to 5-nerved, copiously silky; fertile lemma cartilaginous, lanceolate, acuminate, usually brown, the flat white hyaline margins broad. Perennials, the slender racemes erect or nearly so, aggregate along the upper part of the main axis, forming a white or brownish silky panicle. Species about 12 in the warmer parts of America and in Australia.

Spikelets densely brown-silky; blades mostly 15 to 30 cm. long__ 1. T. insularis.
Spikelets sparsely silky; blades mostly less than 10 cm. long_____ 2. T. pittieri.

1. **Trichachne insularis** (L.) Nees, Agrost. Bras. 86. 1829. SOURGRASS.

Andropogon insularis L. Syst. Nat. ed. 10. 2: 1304. 1759.

Panicum lanatum Rottb. Act. Lit. Univ. Hafn. 1: 269. 1778.

Panicum leucophaeum H. B. K. Nov. Gen. & Sp. 1: 97. 1816.

Panicum insulare Meyer, Prim. Fl. Esseq. 60. 1818.
Syntherisma insularis Millsp. & Chase, Field Mus. Bot. 1: 473. 1902.
Valota insularis Chase, Proc. Biol. Soc. Washington 19: 188. 1906.
Digitaria insularis Mez; Ekman, Ark. för Bot. 13: 22. 1913.

Rather coarse tufted weedy perennial; sheaths sparsely hirsute; blades flat, usually scabrous; silky panicles tawny at maturity.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; open ground, pastures, and waste places, low altitudes, usually below 1,000 meters. Southern Florida and Mexico to Argentina. Type from Jamaica.

A common weed. Called Zacate amargo, cola de buey, torsón.

2. **Trichachne pittieri** (Hack.) Hitchc. Proc. Biol. Soc. Washington 40: 83. 1927.
Panicum pittieri Hack. Oesterr. Bot. Zeitschr. 51: 367. 1901.
Valota pittieri Chase, Proc. Biol. Soc. Washington 19: 188. 1906.

Straggling or spreading perennial; culms many-noded, rather slender, mostly less than 1 meter tall; blades flat, sparsely pilose, mostly 4 to 6 cm. long; panicles greenish, of 5 to 12 slender ascending racemes 3 to 10 cm. long.

Costa Rica; thickets, pastures, and roadsides, vicinity of San José, 1,000 to 2,000 meters. Type from Río Tibirí.

68. DIGITARIA Heist.; Scop. Fl. Carn. ed. 2. 1: 52. 1772

(*Syntherisma* Walt. Fl. Carol. 76. 1788)

Spikelets solitary or in 2's or 3's, subsessile or short-pediceled, alternate in two rows on one side of a 3-angled winged or wingless rachis; spikelets lanceolate or elliptic, plano-convex; first glume minute or wanting; second glume equaling the sterile lemma or shorter; fertile lemma cartilaginous, the hyaline margins pale. Erect or prostrate annuals or perennials, the slender racemes digitate, or somewhat scattered but aggregate along the upper part of the culms. Species about 60 in warmer regions.

Rachis with scattered spreading long hairs. Spikelets narrow, 2.5 mm. long; first glume obsolete or nearly so ---------- **2. D. horizontalis.**
Rachis without long hairs.
Second glume only one-fourth as long as fruit, glabrous ---- **8. D. curtigluma.**
Second glume more than one-fourth as long as fruit.
Spikelets with a tuft of stiff appressed yellowish hairs extending beyond the fruit.
Pedicels with a ring of stiff hairs at summit; racemes 1 to 6, 1 to 8 cm. long ---------- **4. D. argillacea.**
Pedicels without hairs at summit; racemes 8 to 10, 10 to 15 cm. long ---------- **5. D. hirtigluma.**
Spikelets pubescent but without a tuft of stiff hairs at tip.
Spikelets 1.5 mm. long. Plant annual; racemes. 2 to 8 cm. long. **3. D. panicea.**
Spikelets more than 1.5 mm. long.
First glume evident; plant annual, spreading or decumbent; spikelets 3 mm. long ---------- **1. D. sanguinalis.**
First glume obsolete or wanting; plants perennial.
Plants with stout stolons; sheaths and blades densely velvety-pubescent ---------- **9. D. velutina.**
Plants without stolons; sheaths and blades glabrous or pilose.
Racemes 1 to 3 ---------- **7. D. singularis.**
Racemes more than 3 ---------- **6. D. villosa.**

1. Digitaria sanguinalis (L.) Scop. Fl. Carn. ed. 2. 1: 52. 1772. CRABGRASS.
Panicum sanguinale L. Sp. Pl. 57. 1753.
Panicum fimbriatum Kunth, Rév. Gram. 1: 33. 1829.
Panicum linkianum Kunth, Rév. Gram. 1: 33. 1829.
Syntherisma sanguinalis Dulac, Fl. Haut. Pyr. 77. 1867.

Spreading branching annual often rooting at the nodes; sheaths pilose; blades more or less pilose; racemes few to several, ascending or spreading, 5 to 10 cm. long, in 1 or 2 whorls; spikelets about 3 mm. long, the first glume small but distinct.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; open ground, fields, and waste places, low and medium altitudes. Throughout the warmer regions. Type from Europe. A common weed.

2. Digitaria horizontalis Willd. Enum. Pl. 92. 1809.
Milium digitatum Swartz, Prodr. Veg. Ind. Occ. 24. 1788.
Panicum horizontale Meyer, Prim. Fl. Esseq. 54. 1818.
Syntherisma digitata Hitchc. Contr. U. S. Nat. Herb. 12: 142. 1908.
Digitaria digitata Urban, Symb. Antill. 8: 24. 1920. Not *D. digitata* Buese, 1854.

Resembling *D. sanguinalis;* racemes more slender, the narrower rachis bearing scattered long delicate hairs; spikelets narrower, about 2 mm. long, the first glume obsolete.

Guatemala, Honduras, Nicaragua, Costa Rica, Panama; open ground, fields, and waste places, sometimes in partial shade, at low and medium altitudes. Tropical regions of both hemispheres. Type from Dominican Republic.

3. Digitaria panicea (Swartz) Urban, Symb. Antill. 8: 23. 1920.
Milium paniceum Swartz, Prodr. Veg. Ind. Occ. 24. 1788.

Erect or spreading annual 20 to 50 cm. tall; sheaths more or less pubescent; blades short, flat; panicles of 2 to several recemes 2 to 8 cm. long, the rachis narrowly winged; spikelets 1.5 mm. long; first glume wanting; second glume and sterile lemma pubescent, the hairs not extending beyond the spikelet, the glume a little shorter and narrower; fruit brown.

Guatemala, Nicaragua, Panama; open ground, at low and medium altitudes. Mexico and the West Indies to Panama. Type from Jamaica.

4. Digitaria argillacea (Hitchc. & Chase), Fernald., Rhodora 22: 104. 1920.
Syntherisma argillacea Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 296. 1917.

Culms ascending or erect, 15 to 60 cm. tall; sheaths and narrow flat blades pubescent or villous; recemes slender, 1 to 6, ascending, 1 to 8 cm. long, the rachis wingless; spikelets 2 mm. long, the hairs exceeding the tip of the spikelet as a brushlike tip; first glume obsolete; fruit dark brown.

Guatemala, Costa Rica, Panama; savannas and brushy slopes, at low altitudes. Also in the Greater Antilles. Type from Porto Rico.

5. Digitaria hirtigluma Hitchc. Proc. Biol. Soc. Washington 40: 83. 1927.

Culms glabrous, rather robust, about 50 cm. tall (lower part wanting in specimen examined); sheaths keeled, glabrous or somewhat scabrous; blades flat, scabrous, more or less pilose on upper surface especially toward base, 4 to 7 mm. wide, 10 to 15 cm. long (upper one or two only ones seen); panicle 10 to 18 cm. long, the common axis scabrous, about 7 cm. long, villous at base of racemes; racemes 8 to 10, ascending, whitish, 10 to 15 cm. long, the rachis angular, scabrous, very narrowly winged; spikelets about 2.5 mm. long (including the hairs), mostly in 4's, 2 with pedicels about 1 mm. long, 2 with pedicels 3 to 4 mm. long, the pedicels scabrous or scabrous-hirsute, curved or flexuous; first glume wanting; second glume narrower than the fruit and two-

thirds as long, pilose between the nerves and on the margins, the hairs toward the tip stiffer, somewhat rufous, extending beyond nearly a millimeter; sterile lemma as long as the fruit, densely pilose or appressed-hirsute, except along the midnerve, the hairs extending as a stiff brush beyond the tip.

El Salvador (San Salvador, the type).

6. **Digitaria villosa** (Walt.) Pers. Syn. Pl. 1: 85. 1805.
Syntherisma villosa Walt. Fl. Carol. 77. 1788.

Erect cespitose perennial, 50 to 120 cm. tall; sheaths pubescent or glabrate; blades narrow, sometimes loosely involute; panicles of several erect or ascending racemes 8 to 15 cm. long, the rachis narrowly winged; spikelets 2 to 2.5 mm. long; first glume wanting; second glume a little shorter than the fruit, cinereous-pubescent, some of the hairs, especially along the edges, gland-tipped; sterile lemma like the second glume, about as long as the chestnut, apiculate fruit.

Guatemala, Costa Rica; open ground and grassland, 1,000 to 1,500 meters. Southern United States and the West Indies to Costa Rica. Type from South Carolina.

7. **Digitaria singularis** Mez, Bot. Jahrb, Engler **56**: Beibl. **125**: 8. 1921.

Erect slender perennial, 30 to 60 cm. tall; sheaths pilose; blades narrow, glabrous; panicles of 1 to 3 racemes, the rachis narrowly winged; spikelets 2 mm. long; first glume wanting; second glume a little shorter than the fruit, glandular-pubescent; sterile lemma as long as the fruit, glandular-pubescent; fruit chestnut.

Panama; savannas on Pacific side. Also Paraguay, whence the type.

8. **Digitaria curtigluma** Hitchc. Proc. Biol. Soc. Washington **40**: 84. 1927.

Perennial; culms cespitose in large bunches, erect, slender especially at base, 1 to 1.5 meters tall; sheaths glabrous; blades flat, glabrous or somewhat pilose on upper surface near base, 4 to 7 mm. wide, as much as 40 cm. long; panicle 15 to 18 cm. long, the common axis scabrous, 3 to 4 cm. long; racemes 5 or 6, ascending, 10 to 15 cm. long, the rachis winged, the margins as wide as or wider than the central part; spikelets in pairs, about 2.3 mm. long; first glume wanting; second glume glabrous, obtuse or somewhat notched, one-fifth to one-fourth as long as the fruit; sterile lemma as long as the fruit, 5-nerved, the lateral pair close together near the margin, appressed-pubescent on the internerves; fruit dark brown, very convex, minutely punctate in striae.

Panama (El Boquete, about 1,200 meters, on rather open, cut-over hillside, the type).

9. **Digitaria velutina** (DC.) Hitchc. Proc. Biol. Soc. Washington **40**: 84. 1927.
Milium velutinum DC. Cat. Hort. Monsp. 126. 1813.
Syntherisma velutina Chase, Proc. Biol. Soc. Washington **19**: 191. 1906.

Culms erect or ascending from stout stolons, 40 to 80 cm. tall; sheaths and blades densely velvety pubescent; panicle long-exerted, the racemes mostly 5 to 10, ascending, 5 to 10 cm. long, the flexuous rachis narrowly winged; spikelets about 3 mm. long; first glume minute, thin; second glume and sterile lemma equal, as long as the fruit, densely villous with brown hairs; fruit dark purple, somewhat pointed.

Guatemala; grassland, 1,500 to 2,500 meters. Also Mexico, whence the type.

69. STENOTAPHRUM Trin. Fund. Agrost. 175. 1820

Spikelets embedded in one side of an enlarged and flattened corky rachis disarticulating at maturity, the spikelets remaining attached; first glume small; second glume and sterile lemma about equal, the latter with a palea or staminate

flower; fertile lemma chartaceous. Creeping stoloniferous perennials, with short flowering stems, rather broad and short obtuse blades, and terminal and axillary spikes. Species about five; islands of the Pacific; one in tropical America.

1. Stenotaphrum secundatum (Walt.) Kuntze, Rev. Gen. Pl. **2**: 794. 1891.

ST. AUGUSTINE GRASS.

Ischaemum secundatum Walt. Fl. Carol. 249. 1788.

Stenotaphrum americanum Schrank, Pl. Rar. Hort. Monac. *pl. 98*. 1820.

Extensively creeping glabrous parennial, the flat stolons with long internodes and short leafy branches, the sheaths equitant, the blades short, obtuse; flowering culms 10 to 30 cm. tall, the blades commonly 10 to 15 cm. long; racemes terminal and axillary, 5 to 10 cm. long; spikelets 4 to 6 mm. long.

Honduras, Costa Rica, Panama; seacoast on Atlantic side, (Pacific side in Costa Rica). Southern United States to Argentina. Type from South Carolina.

70. THRASYA H. B. K. Nov. Gen. & Sp. 1: 120. *pl. 39*. 1815

Inflorescence a single terminal spikelike raceme, the rachis usually with membranaceous wings, partially embracing the row of spikelets; spikelets apparently subsessile and solitary in a single row, but actually in pairs, the spikelets of each pair back to back, the pedicel of the primary spikelet adnate to the midnerve of the rachis; first glume minute, often hyaline; second glume shorter than the spikelet; sterile lemma subindurate, thinner down the middle, at maturity splitting to the base (the margins of the split rolling inward), or deeply sulcate only, the sterile palea nearly as long as its lemma, the margins firm, inclosing a staminate flower or empty; fruit cartilaginous-indurate, commonly with stiff hairs at the summit. Slender branching perennials, with narrow blades. Eight species have been referred to the genus, and a few others have not yet been segregated from Panicum; tropical America.

Spikelets glabrous_____1. T. campylostachya.
Spikelets pubescent.
  Rachis 3 to 4 mm. wide; culms 1 to 1.5 meters tall_____2. T. petrosa.
  Rachis 2 mm. wide; culms 70 cm. tall_____3. T. hitchcockii.
  Rachis less than 0.5 mm. wide; culms 15 to 30 cm. tall_____4. T. villosa.

1. Thrasya campylostachya (Hack.) Chase, Proc. Biol. Soc. Washington **24**: 115. 1911.

Panicum campylostachyum Hack. Oesterr. Bot. Zeitschr. **51**: 367. 1901.

Culms slender, often straggling, 30 to 80 cm. long; sheaths hirsute to glabrate; blades pubescent to glabrate, 3 to 10 mm. wide; raceme curved, 2 to 10 cm. long, the rachis less than 1 mm. from edge to midrib; spikelets glabrous, 2.5 to 3 mm. long.

Guatemala, El Salvador, British Honduras, Honduras, Costa Rica (type from Cañas Gordas), Panama; savannas, grassy hills and pine woods, up to 1,200 meters. Guatemala to Bolivia.

2. Thrasya petrosa (Trin.) Chase, Proc. Biol. Soc. Washington **24**: 115. 1911.

Panicum petrosum Trin. Gram. Icon. 3: *pl. 280*. 1831.

Tylothrasya petrosa Doell in Mart. Fl. Bras. **2**^{3}: 295. *pl. 37*. 1877.

Culms cespitose, rather robust, 1 to 1.5 meters tall; sheaths pubescent to glabrate; blades elongate; raceme 15 to 20 cm. long, curved; rachis 3 to 4 mm. wide; spikelets about 4 mm. long, villous.

Panama; grassy hills and savannas at low altitudes, Pacific side. Also Venezuela and Peru to Brazil and Paraguay. Type from Brazil.

3. **Thrasya hitchcockii** Chase, Journ. Washington Acad. Sci. 17: 142. 1927.

Tufted perennial; culms about 70 cm. tall; blades 15 to 30 cm. long, 5 to 6 mm. wide, finely pubescent on both surfaces and coarsely pilose; racemes solitary, terminal and axillary, arcuate, slender, 10 to 20 cm. long; spikelets 2.5 mm. long, pilose.

Panama (brushy slopes, Chorrera, the type).

4 **Thrasya villosa** Hitchc. Proc. Biol. Soc. Washington 40: 84. 1927.

Perennial, villous or velvety-pubescent throughout; culms erect, 15 to 30 cm. tall; blades flat, 2 to 4 mm. wide, 5 to 10 cm. long; racemes terminal and axillary, slightly curved, 2 to 5 cm. long, long-villous at the base, the rachis less than 0.5 mm. wide, villous with long and short hairs intermixed, not margined or inrolled; spikelets about 2.5 mm. wide, densely pubescent.

Panama (savannas, Cerro Vaca, eastern Chiriquí, 900 to 1,136 meters, the type).

71. PSEUDECHINOLAENA Stapf in Prain, Fl. Trop. Afr. 9: 494. 1919

Spikelets loosely arranged in several erect or ascending racemes, the back of the fruit of the primary spikelet turned from the axis; first and second glumes about as long as the spikelet, the second uncinate-spiny and ventricose at maturity. Rather delicate annuals with creeping base and broad flat blades. Species 1.

1. **Pseudechinolaena polystachya** (H. B. K.) Stapf in Prain, Fl. Trop. Afr. 9: 495. 1919.

Echinolaena polystachya H. B. K. Nov. Gen. & Sp. 1: 119. 1816.

Panicum uncinatum Raddi, Agrost. Bras. 41. 1823.

Plants creeping and rooting at base; fertile culms erect or ascending, 20 to 40 cm. tall; blades thin, ovate-lanceolate, 3 to 6 cm. long; racemes rather distant, mostly 4 to 8, 2 to 3 cm. long; spikelets 3 to 4 mm. long.

Guatemala, Honduras, Costa Rica, Panama; shady bank, brushy slopes and cultivated groves, up to about 1,500 meters. Mexico to Bolivia and Uruguay. Also in tropical Africa. Type from Colombia.

72. MESOSETUM Steud. Syn. Pl. Glum. 1: 118. 1854

Inflorescence a single erect terminal spikelike raceme, the spikelets subsessile, solitary, in two rows on one side of a slender rachis, the back of the fruit turned from the rachis, ventricose on the side toward the rachis and fitting into its concavities, the back of the spikelet flat or nearly so; glumes and sterile lemma usually bearing stiff hairs on the strong lateral nerves, the midnerve of the sterile lemma faint or suppressed; fruit ventricose on the palea side. Slender, perennials or sometimes apparently annuals, with narrow blades.

Blades pilose; spikelets densely long-pilose on margins and tip; plant perennial
1. M. filifolium.

Blades glabrous; spikelets sparsely pilose; plant apparently annual
2. M. pittieri.

1. **Mesosetum filifolium** Hubb. Proc. Amer. Acad. 49: 494. 1913.

Erect densely cespitose perennial from a thick caudexlike base; culms 40 to 60 cm. tall, hispid at the nodes; blades flat, as much as 3 mm. wide, or involute, pilose; raceme silvery, 5 to 8 cm. long; spikelets 4 to 5 mm. long; first glume long-pilose, a little shorter than the spikelet; second glume and sterile lemma glabrous on the back, pilose on margins and tip; fertile lemma acuminate.

Guatemala, British Honduras; grassy plains and pine ridges, at low altitudes, Atlantic side. Type from Manatee Lagoon, British Honduras.

2. **Mesosetum pittieri** Hitchc. Proc. Biol. Soc. Washington 40: 85. 1927.

Apparently annual; culms spreading, 10 to 30 cm. long; nodes hispidulous; blades flat, distantly setulose on the thickened margin, sparingly pilose near base, 2 to 5 cm. long, 3 to 4 mm. wide; raceme 2 to 4 cm. long; spikelets about 5 mm. long; first glume a little shorter than the equal second glume and sterile lemma, laterally compressed, narrowed to the middle and then widened to a rounded crestlike tip, pilose on the lower part of the keel; second glume laterally compressed above, narrowed to a crestlike acute tip, pilose at the base, sparingly villous on the lower half of the back, 5-nerved, cross-ridged toward the apex; sterile lemma similar to the second glume, the crested tip less acute; fertile lemma acute, shorter than the second glume.

Panama (Chepo, the type); savannas at low altitudes, Pacific side.

73. ERIOCHLOA H. B. K. Nov. Gen. & Sp. 1: 94. 1816

Spikelets dorsally compressed, more or less pubescent, solitary or sometimes in pairs, short-pediceled or subsessile, in two rows on one side of a narrow, usually hairy rachis, the pedicels often clothed with long, stiff hairs, the back of the fertile lemma turned from the rachis; lower rachilla joint thickened, forming a more or less ringlike, usually dark-colored callus below the second glume, the first glume reduced to a minute sheath about this and adnate to it; second glume and sterile lemma about equal, acute or acuminate; fertile lemma indurate, minutely papillose-rugose, mucronate or awned, the awn often readily deciduous, the margins slightly inrolled. Annuals or perennials with terminal panicles consisting of several or many spreading or appressed racemes, usually rather closely arranged along the main axis. Species about 15, in the warmer parts of the world, mostly in America.

Racemes 2 ..... 1. E. distachya.
Racemes several.
  Pedicels long-pilose; spikelets 6 mm. long, narrowed into a subulate glabrous point ..... 2. E. pacifica.
  Pedicels pubescent; spikelets 4 mm. long ..... 3. E. punctata.

1. **Eriochloa distachya** H. B. K. Nov. Gen. & Sp. 1: 95. *pl. 30*. 1816.

Erect perennial; culms 20 to 40 cm. tall, branched above, the slender exserted peduncles bearing 2 (rarely 3) racemes 1 to 2 cm. long, about 1 cm. apart; rachis woolly, the short pedicels with a ring of long hairs at the summit.

Guatemala, Costa Rica, Panama; savannas up to 1,000 meters. Guatemala to Paraguay. Type from Venezuela.

2. **Eriochloa pacifica** Mez, Bot. Jahrb. Engler 56: Beibl. 125: 11. 1921.

Erect or spreading annual as much as 1 meter tall; culms branching, softly pubescent; sheaths pubescent; blades velvety, flat, narrowly lanceolate, as much as 1 cm. wide; panicle 5 to 15 cm. long, of 4 to several ascending or spreading racemes about 2 cm. long, the axis densely pubescent; spikelets about 6 mm. long, densely pubescent on the lower two-thirds, except the ring at base, glabrous on the upper subulate third; pedicel long-pilose at summit; fruit 2 mm. long, obtuse, mucronate.

Nicaragua; rocky slopes at low altitudes, Pacific side. Also Eucador and Peru, whence the type.

3. **Eriochloa punctata** (L.) Desv.; Hamilt. Prodr. Pl. Ind. Occ. 5. 1825.

Milium punctatum L. Syst. Nat. ed. 10. 2: 872. 1759.

Glabrous branching perennial; culms ascending from a decumbent base, commonly 1 meter or more tall; blades flat, 10 to 15 mm. wide; racemes, several

to many, narrowly ascending the axis pubescent and villous; spikelets lanceolate, acute, about 4 mm. long, appressed-pubescent on the lower half; fruit about 2 mm. long, the awn hispidulous, about 1 mm. long.

Guatemala, Costa Rica, Panama; swamps, ditches, and wet places up to about 1,000 meters. Southern United States to Argentina. Type from Jamaica.

74. BRACHIARIA Griseb. in Ledeb. Fl. Ross. 4: 469. 1853

Spikelets dorsally compressed, solitary, rarely in pairs, subsessile in two rows on one side of a 3-angled, sometimes narrowly winged rachis, the first glume turned toward the axis; second glume and sterile lemma about equal, 5 to 7 nerved, the lemma inclosing a hyaline palea and sometimes a staminate flower; fertile lemma indurate, usually papillose-rugose, the margins inrolled, the apex rarely mucronate or bearing a short awn. Annuals or perennials with linear blades and several spreading or appressed racemes along a common axis. Species about 15, in the warmer regions of both hemispheres.

1. **Brachiaria plantaginea** (Link) Hitchc. Contr. U. S. Nat. Herb. **12**: 212. 1909.

Panicum plantagineum Link, Hort. Berol. **1**: 206. 1827.

Erect or often widely spreading, glabrous, branching annual; blades flat, as much as 15 mm. wide; racemes mostly 3 or 4, spreading, 3 to 7 cm. long, remote along the axis, the glabrous spikelets 4 to 4.5 mm. long.

Guatemala, El Salvador, Nicaragua, Costa Rica; ditches, moist places and rich shady soil up to 1,500 meters. Southern United States to Brazil whence the type, and Bolivia.

75. AXONOPUS Beauv. Ess. Agrost. 12, 154. 1812

Spikelets depressed biconvex, not turgid, oblong, usually obtuse, solitary, sessile, and alternate, in two rows on one side of a 3-angled rachis, the back of the fertile lemma turned from the axis; first glume wanting; second glume and sterile lemma equal, the lemma without a palea; fertile lemma and palea indurate, the lemma oblong-elliptic, usually obtuse, the margins slightly inrolled. Stoloniferous or tufted perennials, rarely annuals, with usually flat or folded, abruptly rounded or somewhat pointed blades, and few or numerous, slender, spikelike racemes, digitate or racemose along the main axis. Species about 30, tropical America.

Rachis bearing conspicuous stiff spreading golden yellow hairs. (Section CABRERA.)

Rachis about 0.5 mm. wide, not extending beyond the spikelets. Plant perennial ..... 1. **A. aureus.**

Rachis more than 1 mm. wide, extending beyond the spikelets.

Plant annual; sheaths glabrous or sparingly hispid .. 2. **A. appendiculatus.**

Plant perennial; sheaths papillose-hispid ..... 3. **A. chrysoblepharis.**

Rachis not bearing stiff hairs. (AXONOPUS proper.)

Plants annual. Racemes 2 or 3, delicate ..... 4. **A. capillaris.**

Plants perennial.

Plants cespitose, not stoloniferous.

Blades 8 to 10 mm. wide, rather lax; glume and sterile lemma much exceeding the fruit ..... 8. **A. centralis.**

Blades not more than 6 mm. wide; glume and sterile lemma scarcely exceeding the fruit.

Spikelets not more than 2 mm. long.
Spikelets stiff-pilose along the margin and at apex__10. A. purpusii.
Spikelets glabrous or nearly so_____9. A. ater.
Spikelets about 3 mm. long, pale.
Sheaths and blades villous_____11. A. blakei.
Sheaths and blades glabrous or nearly so_____12. A. poiophyllus.
Plants stoloniferous.
Culms mostly more than 50 cm. tall, sometimes as much as 2 meters tall; racemes of primary culm numerous_____7. A. scoparius.
Culms mostly less than 50 cm. tall; racemes 2 to 5.
Spikelets 1.5 mm. long; glume and sterile lemma not pointed beyond the fruit_____6. A. fissifolius.
Spikelets 2 to 3 mm. long; glume and sterile lemma pointed beyond the fruit_____5. A. compressus.

1. **Axonopus aureus** Beauv. Ess. Agrost. 12. 1812.

Paspalum aureum H. B. K. Nov. Gen. & Sp. 1: 93. 1816.

Tall slender branching perennial; culms wiry, compressed; blades flat, rather firm, spreading; racemes 4 to 15, subdigitate, slender, golden-brown, the stiff orange-yellow hairs in tufts below the spikelets as well as along the margins; spikelets about 1.3 mm. long, glabrous or sparingly appressed-hispid.

El Salvador, Costa Rica, Panama; savannas and grassy hills. Porto Rico and Central America to Brazil and Bolivia. Type from tropical America, exact locality not known.

2. **Axonopus appendiculatus** (Presl) Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 300. 1917.

Paspalum appendiculatum Presl, Rel. Haenk. 1: 211. 1830.

Slender sparingly branching annual with long smooth orange-colored internodes; blades flat, thin, yellowish green, sparsely hispid or glabrous; racemes 2 to 8, subdigitate, 3 to 6 cm. long, the flat green rachis bearing a row of stiff golden hairs on each margin and down the center between the 2 rows of small glabrous spikelets sunken in the rachis.

Panama; savannas and brushy slopes, at low altitudes, Pacific side. Trinidad and Panama, whence the type.

3. **Axonopus chrysoblepharis** (Lag.) Chase, Proc. Biol. Soc. Washington 24: 134. 1911.

Cabrera chrysoblepharis Lag. Gen. & Sp. Nov. 5. 1816.

Paspalum chrysoblephare Doell in Mart. Fl. Bras. 2^2: 119. 1877.

Differs from *A. aureus* in the papillose-hispid sheaths and the stouter racemes, the rachis more than 1 mm. wide, extending beyond the spikelets as a short point; spikelets glabrous, about 2 mm. long.

Costa Rica, Panama, whence the type; savannas and grassy hills up to 500 meters, Pacific side. Costa Rica to Paraguay.

4. **Axonopus capillaris** (Lam.) Chase, Proc. Biol. Soc. Washington 24: 133. 1911.

Paspalum capillare Lam. Tabl. Encycl. 1: 176. 1791.

Anastrophus capillaris Nash, N. Amer. Fl. 17: 161. 1912.

Slender ascending branching, nearly glabrous annual; blades thin, 2.5 to 5 cm. long, about 4 mm. wide; racemes 2 or 3, delicate, about 2.5 cm. long on long subcapillary peduncles; spikelets a little more than 1 mm. long.

El Salvador, Costa Rica; open ground, fields and grassland. Central America to Trinidad and Brazil. Type from tropical America.

5. Axonopus compressus (Swartz) Beauv. Ess. Agrost. 12. 1812.

CARPET GRASS.

Milium compressum Swartz, Prodr. Veg. Ind. Occ. 24. 1788.
Paspalum platicaulon Poir. in Lam. Encycl. Suppl. 5: 34. 1804.
Paspalum compressum Raspail, Ann. Sci. Nat. 5: 301. 1825.
Anastrophus compressus Schlecht.; Doell. in Mart. Fl. Bras. 2^2: 102. 1877.

Nearly glabrous perennial, under favorable conditions producing long leafy stolons with short broad obtuse blades; flowering culms erect or ascending, compressed; blades rather thin, 8 to 10 mm. wide; racemes 2 to 5, slender, along a short axis, 2 or 3 axillary peduncles often produced from the upper node; spikelets glabrous or nearly so, 2 to 3 mm. long.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; grassland, fields, partial shade, common at low altitudes. Southern United States to Argentina. Type from Jamaica.

6. Axonopus fissifolius (Raddi) Kuhlm. Comm. Linhas Telegr. Matto Grosso 67: 87. 1922.

Paspalum fissifolium Raddi, Agrost. Bras. 26, 1823.

Differs from *A. compressus* in its much more slender and decumbent habit, in the nearly conform foliage of stolons and fertile culms, and in the smaller, less pubescent spikelets, the glume and sterile lemma not pointed beyond the fruit; spikelets about 1.5 mm. long.

El Salvador; sandy grassland at low altitudes. El Salvador to Brazil, whence the type, and Bolivia.

7. Axonopus scoparius (Flügge) Hitchc. Contr. U. S. Nat. Herb. 22: 471. 1922.

Paspalus scoparius Flügge, Monogr. Pasp. 124. 1810.

Stout smooth erect perennial as much as 2 meters tall, with long stout stolons; blades as much as 3 cm. wide; panicles as much as 30 cm. long of several to many racemes; spikelets glabrous, 3 mm. long.

El Salvador, Costa Rica, Panama; hills and savannas, Central America to Brazil and Bolivia. Type from Venezuela.

Cultivated for forage from Colombia to Bolivia under the name of gamalote, cachi, and caricachi; under trial in El Salvador.

8. Axonopus centralis Chase, Journ. Washington Acad. Sci. 17: 143. 1927.

Culms cespitose, erect, without stolons, 40 to 100 cm. tall; sheaths glabrous, compressed; blades elongate, 7 to 10 mm. wide; racemes 2 to 5, 8 to 15 cm. long; spikelets narrow, 3 mm. long, silky pubescent on the internerves.

Honduras, Nicaragua, Panama; grassy hills. Only known from Central America. Type from Panama.

9. Axonopus ater Chase, Journ. Washington Acad. Sci. 17: 143. 1927.

Densely tufted perennial; culms 40 to 50 cm. tall; blades folded, 4 to 5 mm. wide; inflorescence terminal and axillary, the terminal of 2 to 5, the axillary of 2 racemes; racemes 4 to 6 cm. long, widely spreading; spikelets 1.8 mm. long, glabrous.

Panama (open slope, Gatún, Canal Zone, the type).

10. Axonopus purpusii (Mez) Chase, Journ. Washington Acad. Sci. 17: 144. 1927.

Paspalum purpusii Mez, Bot. Jahrb. Engler 56: Beibl. 125: 10. 1921.

Closely cespitose, erect or spreading, 30 to 60 cm. tall; blades mostly 1 to 3 mm. wide, often folded, pilose toward the base; racemes mostly 2 to 4, long exserted, 2 to 5 cm. or even 10 cm. long; spikelets 2 mm. long, stiff-pilose along the margins and tip. Differs from *A. compressus* in the cespitose habit, the long narrow blades, and in the pilose spikelets.

Guatemala, British Honduras, Costa Rica, Panama; savannas and open woods at low altitudes. Mexico, whence the type, to Argentina.

11. **Axonopus blakei** Hitchc. Proc. Biol. Soc. Washington 40: 85. 1927.

Culms densely cespitose, erect, about 60 cm. tall; nodes densely villous; sheaths villous, especially at the collar; blades folded at base, flat above, 2 to 4 mm. wide, papillose-pilose, 10 to 25 cm. long; racemes mostly 3, the lower 2 to 3 cm. below the other 2, pubescent at the base, 7 to 12 cm. long; spikelets 3 mm. long, the second glume and sterile lemma pilose along the margins and apex, sparingly pilose on the back, the hairs toward the tip as much as 1 mm. long.

Guatemala (open plains, Cristina, Dept. of Izabal, the type).

12. **Axonopus poiophyllus** Chase, Proc. Biol. Soc. Washington 24: 133. 1911.
Anastrophus poiophyllus Nash, N. Amer. Fl. 17: 163. 1912.

Culms rather stout, cespitose, 50 to 80 cm. tall; nodes hispid; basal sheaths strongly compressed, glabrous; blades firm, elongate, 3 to 5 mm. wide; racemes few to several, erect, approximate, 10 to 15 cm. long; spikelets about 3 mm. long, lightly pubescent.

Guatemala, Honduras, Panama; grassy hills, at low altitudes. Known only from Central America. Type from Secanquím, Guatemala.

76. PASPALUM L. Syst. Nat. ed. 10. 2: 855. 1759

Spikelets plano-convex, usually obtuse, subsessile, solitary or in pairs, in two rows on one side of a narrow or dilated rachis, the back of the fertile lemma toward it; first glume usually wanting; second glume and sterile lemma commonly about equal, the former rarely wanting; fertile lemma usually obtuse, chartaccous-indurate, the margins inrolled. Annuals or perennials, with one to many spikelike racemes, these single or paired at the summit of the culms or racemosely arranged along the main axis. Species about 380, mostly in the warmer regions of America, a few in the Old World.

Rachis membranaceous or foliaceous, mostly broad and winged (scarcely winged in a few species with silky spikelets).
  Spikelets clothed with long silky hairs or conspicuously fringed with long hairs. (Subgenus CERESIA.)
    Second glume broadly winged; sterile lemma fringed with long hairs.
      Rachis narrower than the spikelets; glume cordate at base. 6. P. pectinatum.
      Rachis wider than the spikelets; glume not cordate___ 7. P. contractum.
    Second glume not winged.
      Rachis brightly colored, the margins golden to rufous; spikelets solitary.
        Culms simple; racemes solitary or paired_____ 1. P. stellatum.
        Culms branching; racemes not paired, 2 to 7 on the main culm, solitary on the branches_____ 2. P. heterotrichon.
      Rachis dull greenish, purplish or brown; spikelets paired or solitary.
        Culms branching.
          Rachis 4 to 5 mm. wide; culms robust, clambering. Racemes usually more than 8_____ 3. P. trachycoleon.
          Rachis less than 3 mm. wide; culms not robust and clambering.
            Blades not ciliate, those of the primary culm not more than 7 mm. wide; fringing hairs of the spikelet rather silky, very unequal. 4. P. cymbiforme.
            Blades papillose-ciliate, mostly 8 to 12 mm. wide; fringing hairs of the spikelet stiff, about equal._____ 5. P. humboldtianum.

Spikelets glabrous (or minutely pubescent in *P. repens*). Rachis foliaceous, green. (Group DISSECTA.)
Plants perennial.
Racemes persistent on the axis; rachis with a spikelet at the apex.
8. P. acuminatum.
Racemes falling from the axis; rachis extending beyond the uppermost spikelet---------- 9. P. repens.
Plants annual.
Plants robust, erect; racemes 5 to 15 cm. long, persistent.
12. P. crassum.
Plants slender, spreading or clambering; racemes 1.5 to 5 cm. long, falling entire.
Plants smooth or slightly scabrous; spikelets 2.3 to 2.5 mm. long.
10. P. candidum.
Plants very scabrous throughout, spikelets 1.8 to 1.9 mm. long.
11. P. scabrum.
Rachis not membranaceous, foliaceous, or winged. (Slightly winged in a few species but, if so, spikelets not silky.)
Inflorescence a large flabellate panicle of numerous racemes. Spikelets solitary.
Spikelets glabrous or minutely ciliate---------- 52. P. fasciculatum.
Spikelets obscured by their long silky hairs---------- 67. P. saccharoides.
Inflorescence not flabellate.
Racemes 2, conjugate or nearly so at the summit of the culm, rarely a third raceme below.
Spikelets elliptic or narrowly ovate.
Plants with creeping rhizomes or stolons. (Group DISTICHA).
Second glume pubescent; spikelets relatively turgid.
14. P. distichum.
Second glume and sterile lemma glabrous; spikelets flattened.
13. P. vaginatum.
Plants tufted, not rhizomatous or stoloniferous---------- 19. P. lineare.
Spikelets suborbicular, broadly ovate or obvoate.
Spikelets concave-convex, sparsely long-silky around the margin; plants stoloniferous---------- 49. P. conjugatum.
Spikelets plano-convex, not silky-margined; plants not stoloniferous.
Plants annual, small, slender; spikelets not more than 1.5 mm. long.
Spikelets orbicular, some of them beaded with globular hairs.
40. P. multicaule.
Spikelets obovate, glabrous or minutely pubescent.
Glume and sterile lemma narrower than the fruit, exposing it, spotted with black----------41. P. pictum.
Glume and sterile lemma covering the fruit, not spotted.
42. P. clavuliferum.
Plants perennial; spikelets 1.8 to 3 mm. long.
Rhizome none or short; spikelets somewhat ciliate.
18. P. subciliatum.
Rhizome stout, horizontal, forming a tough sod.
Spikelets 2.5 to 3 mm. long----------16. P. notatum.
Spikelets less than 2.5 mm. long----------17. P. minus.

Racemes 1 to many, racemose or fascicled on the axis, not conjugate.
Second glume wanting.
Fruit smooth and shining----------65. P. pulchellum.
Fruit minutely papillose. Pedicels with long stiff hairs.
64. P. gardnerianum.
Second glume developed.
First glume developed on at least one of the pair of spikelets (commonly obsolete in *P. nutans*).
Spikelets not more than 2 mm. long; plants decumbent, creeping.
First glume small, about equally developed on all spikelets.
22. P. decumbens.
First glume obsolete or only occasionally developed--23. P. nutans.
Spikelets more than 2 mm. long; plants not decumbent.
Spikelets glabrous (sometimes obscurely pubescent in *P. adoperiens*).
Nodes glabrous; sterile lemma not subindurate nor papillose; first glume rudimentary or obsolete------26. P. adoperiens.
Nodes, at least the lower, pubescent; sterile lemma subindurate, minutely papillose; first glume commonly well developed.
Racemes 2 or 3----------24. P. peckii.
Racemes solitary----------25. P. pilosum.
Spikelets pubescent, at least on the second glume.
First glume obsolete or nearly so on the primary spikelet, often or commonly obsolete on the secondary------29. P. botterii.
First glume developed in both spikelets, rarely wanting in the primary one. Spikelets glandular-speckled.
Spikelets sparsely pubescent, 2.2 to 2.6 mm. long; first glume of secondary spikelets small----------27. P. langei.
Spikelets densely pubescent at least on the second glume, 2.9 to 3.2 mm. long; first glume of secondary spikelet one-fifth to two-thirds as long as the spikelet------28. P. variabile.
First glume normally wanting (rarely developed on occasional spikelets).
Racemes terminal and axillary, the axillary sometimes hidden in the sheaths; terminal inflorescence of 1 to 3, rarely to 6, racemes.
Plants rooting at the lower nodes----------23. P. nutans.
Plants erect to widely spreading but not rooting at the nodes. (Group SETACEA.)
Spikelets mostly 2 mm. long, rounded at the summit; blades mostly more than 8 mm. wide---------20. P. ciliatifolium.
Spikelets 1.8 to 1.9 mm. long, slightly pointed; blades not more than 8 mm. wide----------21. P. propinquum.
Racemes terminal on the primary culms or leafy branches, no truly axillary racemes.
Plants annual.
Spikelets with a broad firm notched marginal wing
66. P. fimbriatum.
Spikelets not winged.
Spikelets not more than 1.5 mm. long, elliptic; fruit pale.
Racemes 6 to 35----------45. P. microstachyum.

Racemes 1 to 4. (Group PARVIFLORA.)
Spikelets solitary.
Spikelets orbicular, usually beaded with globular hairs
40. P. multicaule.
Spikelets elliptic not beaded_____43. P. parviflorum.
Spikelets in pairs.
Glume and sterile lemma covering the fruit
42. P. clavuliferum.
Glume and sterile lemma narrower than the fruit exposing it on the sides_____41. P. pictum.
Spikelets 2 to 3 mm. long; fruit dark brown.
Spikelets 2.4 to 3 mm. long, commonly appressed-pubescent
62. P. convexum.
Spikelets not more than 2.2 mm. long; glabrous
63. P. boscianum.
Plants perennial.
Plants creeping, rooting at the nodes.
Plants not stoloniferous, the culms decumbent and rooting at base; fruit pale_____34. P. squamulatum.
Plants stoloniferous; fruit reddish at maturity. (Group ORBICULATA.)
Spikelets not orbicular, more or less elliptic
47. P. jimenezii.
Spikelets suborbicular.
Blades 1 to 6 cm. long; spikelets 1 to 1.2 mm. long
46. P. orbiculatum.
Blades 5 to 13 cm. long; spikelets 1.7 to 1.8 mm. long
48. P. hitchcockii.
Plants not creeping, sometimes rooting at one or two nodes of a decumbent base, if so, spikelets in pairs.
Spikelets conspicuously silky-ciliate around the margin, the hairs long as the spikelets or longer.
Racemes commonly 3 to 5; culms geniculate at base
50. P. dilatatum.
Racemes commonly 12 to 18; culms erect____51. P. urvillei.
Spikelets not conspicuously ciliate.
Fruit dark-brown and shining; spikelets glabrous or minutely appressed-pubescent.
Sterile lemma wrinkled just within the margin
60. P. plicatulum.
Sterile lemma flat_____61. P. centrale.
Fruit pale stramineous (brown but not shining in *P. virgatum*).
Plants robust; culms commonly more than 1 meter, often 2 meters, tall (sometimes slender and smaller in *P. coryphaeum*). Spikelets normally in pairs.
Culms finally freely branching; racemes 10 to 45
59. P. coryphaeum.
Culms simple or with a few simple branches.
Sheaths, at least the lower, harshly hispid. Rachis not ciliate_____30. P. affine.

Sheaths not hispid.
Spikelets pubescent, at least toward the summit; blades flat, more or less arcuate-spreading.
Fruit brown at maturity_____53. P. virgatum.
Fruit pale. Spikelets abruptly acute or subacute.
Rachis not ciliate; spikelets 3.5 mm. long or more_____54. P. acutum.
Rachis conspicuously ciliate; spikelets less than 8 mm. long_____55. P. plenum.
Spikelets glabrous; blades V-shaped in cross-section, ascending.
Spikelets ovate-elliptic; rachis not ciliate.
56. P. arundinaceum.
Spikelets suborbicular, crowded; rachis ciliate.
Panicle not pyramidal, the racemes rarely more than 50; glume and sterile lemma firm in texture_____57. P. millegrana.
Panicle elongate-pyramidal, the racemes commonly more than 70, short and crowded at the summit; glume and sterile lemma fragile_____58. P. densum.
Plants not robust; if more than 1 meter tall, culms relatively slender.
Spikelets suborbicular or broadly obovate or broadly oval.
Spikelets glabrous_____34. P. squamulatum.
Spikelets pubescent.
Spikelets 1.7 to 1.9 mm. long, not densely crowded.
35 P. lentiginosum.
Spikelets not more than 1.5 mm. long, usually less, crowded _____36. P. paniculatum.
Spikelets elliptic to oval or obovate.
Culms decumbent at base, rooting at the lower nodes, branching.
Sheaths, at least the lower, harshly hispid.
29. P. botterii.
Sheaths not hispid_____15. P. lividum.
Culms erect to spreading, not rooting at the nodes.
Spikelets not more than 1.8 mm. long.
Spikelets solitary_____44. P. standleyi.
Spikelets in pairs.
Spikelets about 1.3 mm. long, glandular-pubescent_____37. P. blodgettii.
Spikelets 1.5 to 1.8 mm. long.
38. P. caespitosum.
Spikelets 2 mm. or more long.
Blades firm, folded at base, more or less involute-margined. Plants in hard tufts.
15. P. lividum.
Blades relatively lax, flat.
Blades 1 to 2.5 cm. wide.
Spikelets elliptic, subacute.
33. P. costaricense.

Spikelets elliptic-obovate.
Second glume shorter than the spikelet; racemes usually fewer than 10.
29. P. botterii.
Second glume covering the fruit; racemes 10 to 30 30. P. affine.
Blades not more than 1 cm. wide.
Foliage velvety-pubescent throughout.
31. P. tenellum.
Foliage not velvety-pubescent.
Rachis more than 1 mm. wide
15. P. lividum.
Rachis less than 1 mm. wide.
Foliage glabrous 39. P. umbratile.
Foliage pubescent 32. P. tonduzii.

1. **Paspalum stellatum** Humb. & Bonpl. in Flügge, Monogr. Pasp. 62. 1810.

Culms simple, 40 to 80 cm. tall, slender and wiry; blades involute-setaceous, racemes solitary or paired, 2.5 to 10 cm. long, the second shorter, commonly reduced to a rudiment; rachis 5 to 7 mm. wide, abruptly mucronate, the papery winged margins golden brown to purplish maroon; spikelets solitary, 3 mm. long, almost hidden in long white hairs, the pedicels radiately pilose.

Honduras, Salvador, Costa Rica, Panama; savannas and rocky slopes, 500 to 1,500 meters altitude, southern Mexico and Hispaniola to Argentina. Type from Colombia.

2. **Paspalum heterotrichon** Trin. Gram. Icon. 3: *pl. 285.* 1831.

Culms slender, wiry, 50 to 90 cm. tall, finally branching and leaning or clambering, the nodes bearded; blades becoming involute, at least toward the tip, the uppermost reduced to a setaceous point; racemes of the primary culm 2 to 7, those of the branches usually solitary, 1 to 6 cm. long on short slender bearded pedicels, 1 to 2 cm. distant along a subfiliform slightly flexuous axis; rachis 3 to 4 mm. wide, glabrous, the margins golden-ochraceous; spikelets solitary, whitish, 2.5 mm. long, fringed with copious white hairs.

Panama; open grassy hillsides and savannas at moderate altitudes, Panama to Peru and Brazil, whence the type; also Haiti..

3. **Paspalum trachycoleon** Steud. Syn. Pl. Glum. 1: 28. 1854.

Somewhat woody, clambering or trailing; culms 1 to 2 meters tall, branching from the middle and upper nodes, the branches elongate, leafy; nodes bearded; foliage glaucous-olivaceous, the blades flat, 10 to 18 cm. long, 8 to 15 cm. wide, densely papillose-velvety on both surfaces and with long stiff hairs at the base: racemes mostly 9 to 12, ascending, 3 to 6 cm. long, approximate; rachis herbaceous, 4 to 5 mm. wide, olive-green or purplish, long-pilose at the base; spikelets about 2.5 mm. long, silky, mostly in pairs, densely crowded.

Guatemala, Honduras, Salvador; open or brushy banks and slopes, 1,000 to 1,700 meters altitude, Guatemala to Brazil. Type from Venezuela.

4. **Paspalum cymbiforme** Fourn. Mex. Pl. 2: 5. 1886.

Culms erect, 50 to 100 cm. tall, in small hard clumps; blades 7 to 15 cm. long, 3 to 7 mm. wide, obscurely puberulent on the upper surface, glabrous beneath; racemes 2 or 3, flexuous or falcate, 5 to 7 cm. long; rachis 2 to 2.5 mm. wide, the wings brownish, membranaceous, a tuft of white hairs at base; spikelets in pairs, 3 mm. long, tawny or purplish, pilose and stiffly ciliate with long unequal hairs.

Guatemala; rocky slopes in the uplands, Mexico, whence the type, and Guatemala.

5. **Paspalum humboldtianum** Flügge, Monogr. Pasp. 67. 1810.

Culms erect or ascending from a woody decumbent base, 40 to 80 cm. tall, usually branching from the middle nodes; blades flat, firm, spreading, 8 to 18 cm. long, 8 to 15 mm. wide (those of the branches reduced); racemes mostly 2 to 5, ascending or nodding, silky, 5 to 10 cm. long, 1 to 3 cm. distant; rachis narrowly winged, 2 to 3 mm. wide; spikelets about 3 mm. long, fringed with white hairs.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; stony open or bushy slopes in the highlands, Mexico to Argentina. Type from Ecuador.

6. **Paspalum pectinatum** Nees in Trin. Gram. Icon. 1: *pl. 117*. 1828.

Culms simple, 30 to 100 cm. tall, in coarse tufts, the base hard, smooth, reddish; blades rather thick, 3 to 5 mm. wide, densely harshly villous; racemes 1 to 3, usually 2, closely approximate, 4 to 8 cm. long; spikelets solitary, 4.5 to 6 mm. long, flat, conspicuously ciliate with stiff hairs.

Honduras, Costa Rica, Panama; savannas and rocky open slopes up to 1,800 meters, Honduras to southern Brazil, whence the type.

7. **Paspalum contractum** Pilger, Bot. Jahrb. Engler **25**: 709. 1898.

Culms erect, simple, 50 to 90 cm. tall; leaves aggregate on the lower half of the culms; blades 2 to 4 mm. wide, conspicuously pilose on both surfaces; racemes 2 or 3, closely approximate, 3.5 to 7 cm. long; rachis 4.5 to 5 mm. wide, the membranous wings golden brown; spikelets solitary, 5 to 5.5 mm. long, bearded at the base, the margin stiffly ciliate.

Panama (Picacho de Olá,); open slopes, 500 to 1,000 meters altitude, Panama to northern Brazil. Type from Colombia.

8. **Paspalum acuminatum** Raddi, Agrost. Bras. 25. 1823.

Aquatic or subaquatic perennial, the flowering culms 30 to 100 cm. long; blades flat, soft, 4 to 12 cm. long, 5 to 12 mm. wide; racemes 3 to 5, 3.5 to 7 cm. long, rachis membranaceous, 3 to 3.5 mm. wide, the margins inflexed over the base of the spikelets, minutely hispidulous; spikelets solitary, 3.5 mm. long, elliptic glabrous.

Guatemala (without locality, *Bernoulli & Cairo* 938); shallow water or wet open ground, southern Louisiana to Argentina. Type from Brazil.

9. **Paspalum repens** Bergius, Act. Helv. Phys. Math. 7: 129. *pl.* 7. 1762.

Paspalum mucronatum Muhl. Cat. Pl. 8. 1813; Descr. Gram. 96. 1817.

Paspalum pyramidale Nees, Agrost. Bras. 77. 1829.

Aquatic, rarely terrestrial, perennial, with submerged culms, the sheaths of the floating branches inflated, flask-shaped; blades flat, thin, 10 to 30 cm. long, 12 to 15 mm. wide; racemes numerous, 3 to 5 cm. long, tardily falling entire; rachis 1.5 mm. wide; spikelets solitary, whitish, 1.5 to 2 mm. long, elliptic.

Guatemala, El Salvador, Costa Rica, Panama; floating in sluggish streams or standing water or creeping in wet places, southern United States to Paraguay. Type from Dutch Guiana.

10. **Paspalum candidum** (Humb. & Bonpl.) Kunth, Mém. Mus. Hist. Nat. **2**: 68. 1815.

Reimaria candida Humb & Bonpl.; Flügge, Monogr. Pasp. 214. 1810.

Straggling or clambering branching annual; culms usually 1 m. long, smooth and shining; blades flat, thin, spreading, softly pubescent on both surfaces to glabrous; panicle 5 to 12 cm. long; racemes 8 to 20, ascending to spreading, falling entire, 2 to 4 cm. long; rachis membranaceous, 2 to 2.5 mm. wide, extending 2 to 3 mm. beyond the spikelets; spikelets solitary, about 2.5 mm. long, white, glabrous, both glumes wanting.

Guatemala, El Salvador, Costa Rica, Panama; moist shaded banks and slopes up to 1,800 meters, southern Mexico to Chile. Type from Ecuador.

11. Paspalum scabrum Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 36. *pl. 3.* 1897.

Straggling or clambering annual, with long retrorsely scabrous branches; blades flat, thin, spreading or reflexed, 5 to 10 cm. long, 1 to 2.5 cm. wide, lanceolate-elliptic, papillose-pilose on both surfaces; panicles 10 to 20 cm. long; racemes 20 to 50, spreading, 1.5 to 5 cm. long, falling entire; rachis membranaceous, thin, scabrous, about 2 mm. wide, the acuminate apex extending 2 to 3 mm. beyond the spikelets; spikelets solitary, white, about 1.8 mm. long, oblong-elliptic, glabrous, both glumes wanting.

Guatemala; brushy slopes up to 2,800 meters, Guatemala, Colombia to Ecuador. Type from Guatemala (Chupadero, Dept. Santa Rosa).

12. Paspalum crassum Chase, Contr. U. S. Nat. Herb. 17: 239. 1913.

Large coarse annual; culms stout, erect, 40 to 200 cm. tall, simple or sparingly branching from the lower nodes; sheaths coarsely papillose-hispid; blades flat, 2.5 to 3 cm. wide, conspicuously papillose-hispid on both surfaces; panicle 15 to 20 cm. long; racemes 4 to 10, arched, 5 to 15 cm. long; rachis about 3 mm. wide; spikelets solitary, pale green, about 3 mm. long, oval, turgid, blunt, glabrous.

El Salvador (Ahuachapán); open grassy ground, Mexico, whence the type, El Salvador, Venezuela, Peru.

13. Paspalum vaginatum Swartz, Prodr. Veg. Ind. Occ. 21. 1788.

Extensively creeping perennial with horizontal rhizomes, pale, glabrous as a whole, stoloniferous, often forming extensive colonies, the flowering branches ascending or erect, 8 to 60 cm. tall, the leaves often conspicuously distichous; sheaths commonly overlapping, loose; racemes commonly 2, closely approximate, at first appressed together, finally spreading or reflexed; spikelets mostly 3 to 4 mm. long, acute, glabrous.

Guatemala, El Salvador, Nicaragua, Costa Rica, Panama; seacoasts and brackish sands, often forming pure stands, southern United States to Argentina and Chile. Type from Jamaica.

14. Paspalum distichum L. Syst. Nat. ed. 10. 2: 855. 1759.

Resembling *P. vaginatum* in habit, the nodes usually pubescent, the sheaths less loose than in that species, the spikelets averaging smaller, the first glume frequently developed, the second glume minutely appressed-pubescent.

Guatemala, Costa Rica; ditches and wet, rarely brackish places, southern United States to Argentina and Chile. Type from Jamaica.

15. Paspalum lividum Trin. in Schlecht. Linnaea 26: 383. 1854.

Glabrous perennial; culms solitary or few in a tuft, ascending from a creeping base, 0.5 to 1 meter tall; blades 3 to 6 mm. wide; racemes usually 4 to 7, distant about half their own length on a very slender flexuous axis, 1.5 to 5 cm. long, thick and densely flowered; rachis 1.5 to 2 mm. wide, dark livid purple; spikelets in pairs, 2 to 2.5 mm. long, obovate.

Guatemala; low ground, wet savannas and swamps, and along streams and ditches, southern United States to Uruguay. Type from Mexico.

16. Paspalum notatum Flügge, Monogr. Pasp. 106. 1810.

Ascending perennial with short stout woody horizontal rhizomes; culms simple, 15 to 50 cm. tall; leaves crowded at the base, the blades 3 to 10 mm. wide, usually sparsely ciliate toward the base; racemes 2, subconjugate, recurved-ascending, usually 4 to 7 cm. long; spikelets solitary, 2.5 to 3.5 mm. long, glabrous.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; open ground, savannas and pastures up to 2,000 meters. Mexico to Argentina and the West Indies. Type from St. Thomas.

17. **Paspalum minus** Fourn. Mex. Pl. 2: 6. 1886.

Similar to *P. notatum*, commonly in denser mats, on the average smaller, the culms rarely more than 30 cm. tall, the racemes more slender, the spikelets 2 to 2.5 mm. long.

Guatemala, Nicaragua, Costa Rica, Panama; open slopes and savannas up to 1,500 meters, Mexico, whence the type, to Paraguay and in the West Indies.

18. **Paspalum subciliatum** Chase, Journ. Washington Acad. Sci. 17: 144. *f. 1.* 1927.

Tufted perennial, leafy below; culms erect and crowded from a short horizontal rhizome, the innovations short and subglobose, resembling bulblets at the base of the flowering culms; culms simple 15 to 45 cm. tall; blades 2 to 3 mm. wide, long-pilose on the upper surface toward the base; racemes, 2, conjugate, 3 to 6 cm. long; rachis slender, flexuous, with a dense tuft of short white hairs at base; spikelets solitary, elliptic, subacute, 2.3 mm. long, ciliate along the edges.

Panama; open savannas; found also in Brazil. Type from Panama (Balboa).

19. **Paspalum lineare** Trin. Gram. Pan. 99. 1826.

Slender densely cespitose perennial; culms simple, stiffly erect, 40 to 80 cm. tall; blades folded, very narrow, elongate; racemes usually 2, erect or slightly spreading, approximate, 3 to 5 cm. long; spikelets solitary, 4 to 4.5 mm. long, elliptic, glabrous except for an obscure tuft of hairs on either side at base.

Costa Rica; savannas. Cuba to Argentina. Type from Brazil.

20. **Paspalum ciliatifolium** Michx. Fl. Bor. Amer. 1: 44. 1803.

Slender perennial in rather open tufts; culms erect to widely spreading, 35 to 90 cm. tall, glabrous; blades flat, mostly 10 to 20 cm. long, and 7 to 12 mm. wide, usually strongly ciliate; racemes 1 to 3, slender, arching, mostly 7 to 10 cm. long; spikelets in pairs, 2 mm. long, elliptic-obovate to suborbicular, glabrous or minutely pubescent with obscurely capitate hairs.

Honduras (Tela); open ground or open woods, mostly in sandy soil, southeastern United States and West Indies. Type from Carolina.

21. **Paspalum propinquum** Nash, Bull. N. Y. Bot. Gard. 1: 291. 1899.

Closely related to *P. ciliatifolium*, the rhizome commonly more developed than in that species, the blades rather firmer and rarely more than 8 mm. wide; spikelets about 1.8 mm. long, elliptic-obovate, slightly pointed.

Honduras, El Salvador, Nicaragua, Costa Rica, Panama; sandy savannas and sand barrens, Florida, whence the type, and the West Indies to Mexico and Panama.

22. **Paspalum decumbens** Swartz, Prodr. Veg. Ind. Occ. 22. 1788.

Paspalum pedunculatum Poir. in Lam. Encycl. Suppl. 4: 315. 1816.

Low freely branching perennial; culms spreading or creeping, rooting at the lower nodes, 10 to 70 cm. long; blades flat, spreading, velvety to sparsely pubescent on both surfaces, 5 to 10 cm. long, 6 to 12 mm. wide; peduncles 2 to 8 from the uppermost sheath, very slender; racemes solitary, 1 to 3.5 cm. long, arcuate; spikelets 1.7 mm. long, obovate, glabrous, the first glume developed.

Guatemala, Costa Rica, Panama; open or partly shaded slopes up to 1,600 meters, Guatemala and the West Indies to Brazil and Bolivia. Type from Jamaica.

23. Paspalum nutans Lam. Tabl. Encycl. 1: 175. 1791.

Low branching perennial, spreading or creeping with ascending ends or, in shade, suberect from a decumbent base; culms 25 to 50 cm. long; blades flat, spreading, 5 to 15 cm. long, 5 to 15 mm. wide, usually finely pubescent on both surfaces, sometimes glabrous; peduncles 1 to 4 from the terminal sheath only, very slender, the primary one often with 2 to 4 racemes, the others with one only; racemes 2 to 6 cm. long; spikelets about 2 mm. long, obovate-elliptic, nearly glabrous, the first glume obsolete or occasionally developed on the secondary spikelet.

Honduras, El Salvador, Costa Rica, Panama; partly shaded slopes and banks and mossy cliffs up to 1,000 meters. Central America and the West Indies to Brazil. Type from tropical America, the exact locality unknown.

24. Paspalum peckii Hubb. Proc. Amer. Acad. 49: 495. 1913.

Densely tufted perennial; culms erect, 70 to 80 cm. tall; blades erect, flat, linear, 5 to 8 mm. wide, sparsely puberulent on both surfaces; peduncles slender, elongate, 1 or 2 from the upper sheath; racemes 2 or 3, subfalcate 6 to 12 cm. long; spikelets 2.7 mm. long, elliptic-obovate, glabrous, the first glume often present on the secondary spikelet.

British Honduras (Manatee Lagoon). Known only from the type collection.

25. Paspalum pilosum Lam. Tabl. Encycl. 1: 175. 1791.

Panicum monostachyum H. B. K. Nov. Gen. & Sp. 1: 96. 1816.

Olivaceous tufted perennial; culms ascending or spreading, 40 to 115 cm. tall; blades flat, 3 to 8 mm. wide, harshly pubescent on both surfaces; peduncles slender, elongate, 1 to 4 from the upper and middle sheaths; racemes solitary, arcuate, 5 to 15 cm. long; spikelets 2.6 to 3 mm. long, elliptic, glabrous, the first glume usually well developed on the secondary spikelet.

Costa Rica, Panama; open or sparsely wooded slopes and brushy savannas, mostly in rather moist soil, up to 1,500 meters, Costa Rica to Brazil and Bolivia. Type from tropical America, the exact locality not known.

26. Paspalum adoperiens (Fourn.) Chase, Contr. U. S. Nat. Herb. 28: 102. *f. 55.* 1929.

Dimorphostachys adoperiens Fourn. Mex. Pl. 2: 15. 1886.

Paspalum guatemalense Bartlett, Proc. Amer. Acad. 43: 49. 1907.

Tufted perennial; culms ascending, 35 to 100 cm. tall; blades flat, mostly 8 to 12 cm. long and 8 to 15 mm. wide, more or less harshly papillose-pilose on both surfaces; racemes 2 to 4, or on axillary peduncles sometimes solitary, 3 to 7 cm. long; spikelets 2 to 2.5 mm. long, broadly obovate-elliptic to suborbicular, mostly glabrous, pale or tawny, the first glume often present on the secondary spikelet.

Guatemala, El Salvador; moist, mostly sandy ground up to 1,500 meters, southern Mexico, whence the type, to Salvador.

27. Paspalum langei (Fourn.) Nash, N. Amer. Fl. 17: 179. 1912.

Dimorphostachys langei Fourn. Mex. Pl. 2: 14. 1886.

A rather slender olivaceous perennial in tufts of few to several culms, 30 to 100 cm. tall; blades flat, rather thin, 10 to 40 cm. long, 6 to 15 mm. wide; peduncles slender, 1 to 3 from the upper sheath; racemes 2 to 5, arcuate, 5 to 10 cm. long; spikelets about 2.5 mm. long, elliptic-obovate, olive-green, turning brown, the first glume minute on the primary spikelet, well developed and acute on the secondary.

El Salvador, Nicaragua, Costa Rica; moist woods, shaded slopes and banks, mostly at low altitudes, southern United States and the West Indies to Venezuela. Type from Mexico.

28. Paspalum variabile (Fourn.) Nash, N. Amer. Fl. 17: 180. 1912.

Dimorphostachys variabilis Fourn. Mex. Pl. 2: 15. 1886.

Leafy perennial in tufts of few to several culms 70 to 100 cm. tall; blades flat, 10 to 30 cm. long. 7 to 15 mm. wide; peduncles slender, 1 to 3 from the upper sheath, the axillary mostly solitary; racemes 2 to 4 on the primary peduncle, usually solitary on the axillary peduncles, 4 to 9 cm. long; spikelets about 3 mm. long, elliptic-obovate, pubescent, the first glume well developed on both spikelets of the pair.

Costa Rica (Guanacaste); open or brushy slopes, mostly in rich soil, at middle altitudes, Mexico, whence the type, and Costa Rica.

29. Paspalum botterii (Fourn.) Chase, Journ. Washington Acad. Sci. 13: 436. 1923.

Dimorphostachys botterii Fourn. Mex. Pl. 2: 14. 1886.

Leafy perennial in tufts of few to several culms 60 to 130 cm. tall; blades flat, 14 to 40 cm. long, 1 to 2 cm. wide, glabrous to harshly pubescent; terminal panicles of 4 to 15 arcuate-spreading racemes, 6 to 14 cm. long; axillary peduncles with 1 to 3 racemes; spikelets about 2.5 mm. long, elliptic-obovate, pubescent, the first glume obsolete on the primary spikelet, usually developed on the secondary one.

Guatemala; banks of streams and ditches, and on moist open or partly wooded slopes at middle altitudes, Mexico, whence the type, and Guatemala.

30. Paspalum affine Steud. Syn. Pl. Glum. 1: 24. 1854.

Olivaceous perennial; culms ascending from a geniculate base, 1 to 2 meters tall; sheaths sparsely tuberculate-hispid; blades flat, 15 to 50 cm. long, 1.2 to 2.3 cm. wide, glabrous or nearly so; panicle nodding, of 10 to 30 ascending to drooping racemes, the lower 7 to 10 cm. long, the upper gradually shorter; spikelets crowded, 2 to 2.3 mm. long, obovate-elliptic, purple-blotched, the glume silky-pubescent on the margin.

Guatemala (Puerto Barrios); swamps and rich moist open or brushy ground, up to 1,300 meters altitude, Mexico, whence the type and Guatemala.

31. Paspalum tenellum Willd. Enum. Pl. 89. 1809.

Softly pubescent perennial; culms 30 to 150 cm. tall; blades flat, 10 to 25 cm. long, 0.8 to 2 cm. wide; panicle of usually 5 to 10 spreading or ascending rather thick racemes, the lower 2 to 8 cm. long, the upper gradually shorter; spikelets about 2 mm. long, obovate-elliptic, densely pubescent.

Guatemala, El Salvador; open, mostly moist ground, depressions in rocky slopes, along ditches and roadsides, between 700 and 2,500 meters altitude, Mexico to Brazil and Ecuador. Type a garden specimen, the original country unknown.

32. Paspalum tonduzii Mez, Repert. Sp. Nov. Fedde 15: 72. 1917.

Slender coarsely papillose-pilose perennial about 1 meter tall; panicle 9 to 11 cm. long, of 8 racemes, the axis and rachises dark purple; spikelets, about 2 mm. long, obovate-elliptic, nearly glabrous, purplish.

Costa Rica; known only from the type collection, Santa Rosa del Copey, 1,800 meters.

33. Paspalum costaricense Mez, Repert. Sp. Nov. Fedde 15: 72. 1917.

Leafy perennial in dense clumps; culms ascending or erect from a spreading base, 25 to 85 cm. tall; blades flat, thin, 6 to 22 cm. long, 1 to 2.5 cm. wide; racemes mostly 5 to 7, commonly arching, 2 to 6 cm. long; spikelets on slender pedicels, densely crowded, about 2 mm. long, elliptic, subacute, minutely pubescent.

Guatemala, El Salvador, Costa Rica; humid wood borders, thickets, or partly shaded grassland, sometimes a weed in coffee plantations, at middle altitudes, Central America. Type from Costa Rica (San José).

34. Paspalum squamulatum Fourn. Mex. Pl. 2: 11. 1886.

Straggling perennial; culms decumbent, often rooting at the lower nodes, 25 to 90 cm. long, branching below; blades flat, 5 to 15 cm. long, commonly 6 to 10 mm. wide, softly pubescent to nearly glabrous; racemes commonly 5 or 6, mostly spreading, 1.5 to 6 cm. long; spikelets densely crowded, about 1.8 mm. long, broadly elliptic, glabrous.

Guatemala, Nicaragua, Costa Rica; brushy slopes, pine woods and partly shaded places in uplands, 500 to 1,700 meters altitude, Mexico, whence the type, to Costa Rica.

35. Paspalum lentiginosum Presl. Rel. Haenk. 1: 218. 1830.

Nearly glabrous tufted perennial; culms 75 to 140 cm. tall, sparingly branching; blades flat, 8 to 14 mm. wide; panicle commonly of 5 to 13 racemes 3 to 7 cm. long; spikelets loosely imbricate, about 1.8 mm. long, subhemispheric, pubescent.

Guatemala; open mostly moist ground, at low and medium altitudes, western Mexico (whence the type), and Guatemala.

36. Paspalum paniculatum L. Syst. Nat. ed. 10. 2: 855. 1759.

Coarse leafy perennial in tough clumps with densely hirsute innovations at base; culms suberect or ascending, usually 50 to 100 cm. tall; blades flat, 1 to 2 cm. wide, hispid; panicle usually 8 to 20 cm. long, of several to many arched-spreading somewhat fascicled racemes, the lower 5 to 10 cm. long; spikelets densely crowded, about 1.3 mm. long, subhemispheric, pubescent.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; moist open ground and brushy slopes, along ditches, and a weed in cultivated and waste places, mostly at low altitudes but reaching 2,100 meters, Mexico and the West Indies to Argentina, and many tropical regions of the Old World. Type from Jamaica.

37. Paspalum blodgettii Chapm. Fl. South. U. S. 571. 1860.

Paspalum simpsoni Nash, Bull. Torrey Club 24: 39. 1897.

Cespitose perennial with a tough base, the innovations and culm bases commonly somewhat swollen, the scales densely pubescent; culms erect, slender, 40 to 100 cm. tall; lower leaves crowded; blades flat, 5 to 10 mm. wide, glabrous or nearly so; racemes mostly 3 to 8, slender, arcuate-spreading, 2 to 8 cm. long; spikelets crowded, about 1.3 mm. long, obovate, glandular-pubescent.

Honduras (Copán); open or brushy calcareous soil, southern Florida and the West Indies. Type from Key West, Fla.

38. Paspalum caespitosum Flügge, Monogr. Pasp. 161. 1810.

Densely cespitose bluish green perennial; culms erect, slender, rather wiry, the base hard and slightly enlarged, 30 to 60 cm. tall, simple; blades flat or more or less folded or involute, rather firm, 4 to 10 mm. wide; racemes mostly 3 to 5, relatively thick, 1.5 to 6 cm. long, ascending, remote; spikelets crowded, 1.5 to 1.8 mm. long, elliptic, pubescent.

Guatemala; mostly in partly shaded humus in limestone soil or rock, sometimes in sandy pinelands, southern Florida and the West Indies. Type from Hispaniola.

39. Paspalum umbratile Chase, Contr. U. S. Nat. Herb. 28: 132. *f.* 76. 1929.

Slender perennial in small clumps with a knotted base, the young shoots densely villous; culms 30 to 55 cm. tall; blades flat, rather firm, 6 to 10 mm. wide, sparsely long-pilose at the base and sparsely appressed-pubescent through-

out; racemes 2 to 3, slender, 1 to 1.5 cm. distant, 4 to 6.5 cm. long; spikelets about 2 mm. long, elliptic, sparsely pubescent, the slender pedicels usually nearly as long as the spikelets.

Honduras; known only from the type, collected on a wet shaded bank, Siguatepeque.

40. **Paspalum multicaule** Poir. in Lam. Encycl. Suppl. 4: 309. 1816.

Slender annual in dense tufts; often forming mats; culms branching at the lower nodes, spreading or ascending, 20 to 45 cm. tall; blades flat, 2 to 15 cm. long, 1.5 to 2.5 mm. wide, papillose-pilose; racemes 2, paired, divergent, usually 2 to 4 cm. long, yellowish; spikelets solitary, about 1.3 mm. long, subhemispheric, more or less beaded with subglobular hairs.

Honduras, Costa Rica, Panama; moist eroded places in savannas and open usually disturbed or washed ground, mostly at low altitudes, southern Mexico and the West Indies to Brazil, whence the type, and Bolivia.

41. **Paspalum pictum** Ekman, Ark. för Bot. 10[17]: 11, *pl. 1. f. 6.* 1911.

Paspalum maculatum Nash, N. Amer. Fl. 17: 186. 1912.

Slender tufted annual; culms branching from the lower nodes, erect, 25 to 50 cm. tall; blades folded, about 1 mm. wide as folded, glabrous on the outer surface, sparsely papillose-pilose within; racemes 1 to 4, usually 2, arcuate-spreading, 1 to 5 cm. long, yellowish; spikelets in pairs, crowded, 1 mm. long, obovate-pyriform, turgid, glabrous.

Costa Rica (Boruca); moist places in savannas, Costa Rica to Brazil and Bolivia. Type from Brazil, the type of *P. maculatum* from Costa Rica.

42. **Paspalum clavuliferum** Wright, Anal. Acad. Cienc. Habana 8: 203. 1871.

Paspalum pittierii Hack.; Beal, Grasses N. Amer. 2: 88. 1896.

Very slender tufted annual; culms branching at the lower and sometimes at the middle nodes, 5 to 45 cm. tall; blades flat, 1.5 to 3 mm. wide, more or less papillose-pilose; racemes solitary or paired, arcuate, 1 to 5 cm. long, the peduncle filiform; spikelets in pair, about 1.3 mm. long, elliptic-obovate, more or less pubescent with capitellate hairs.

Costa Rica, Panama; moist spots in sandy savannas and barrens, eroded places in open or brushy slopes, waste and cultivated ground, mostly at low altitudes, southern Mexico and Cuba, whence the type, to Brazil.

43. **Paspalum paviflorum** Rohdé; Flügge, Monogr. Pasp. 98. 1810.

Slender densely tufted conspicuously pilose annual; culms branching from the lower and middle nodes, ascending or spreading, 5 to 15 cm. tall; blades mostly flat, 1 to 2 mm. wide; racemes 2 to 4, spreading or reflexed, 5 to 25 mm. long; spikelets solitary, 0.8 mm. long, oblong-elliptic.

Panama; sandy savannas and sand barrens, Panama and Porto Rico, whence the type, to Brazil.

44. **Paspalum standleyi** Chase, Journ. Washington Acad. Sci. 17: 146. *f. 3.* 1927.

Slender tufted perennial, forming leafy mats; culms spreading or creeping, 20 to 25 cm. long; leaves aggregate at the base, the blades flat, 3 to 6 mm. wide, more or less papillose-pilose; racemes 3 or 4, spreading 2.5 to 4 cm. long; spikelets solitary, 1.6 mm. long, narrowly ovate, glabrous.

Panama; known only from the type collection, marshy thicket, Juan Diaz.

45. **Paspalum microstachyum** Presl, Rel. Haenk. 1: 215. 1830.

Paspalum effusum Nees, Journ. Bot. Kew. Misc. 2: 104. 1850. Not *P. effusum* Rasp. 1825.

Slender branching annual; culms ascending or erect from a geniculate base, 20 to 135 cm. long, branching at the lower and middle nodes, often purplish; blades flat, rather thin, 6 to 20 mm. wide, glabrous to papillose-pilose; panicles

terminal and axillary, subpyramidal, nodding; racemes 6 to 35, spreading or arcuate, 3 to 8 cm. long; spikelets in pairs, not crowded, 1.5 mm. long, elliptic, pubescent.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; roadsides, waste places, and in cultivated ground, at low altitudes, Guatemala to Ecuador and Brazil. Type locality unknown.

46. Paspalum orbiculatum Poir. in Lam. Encycl. **5**: 32. 1804.

Paspalum pusillum Vent.; Flügge, Monogr. Pasp. 100. 1810.

Low creeping perennial, with long leafy stolons and ascending flowering branches 5 to 20 cm. tall, often forming dense mats; blades flat, 1 to 6 cm. long, 2 to 7 mm. wide; racemes usually 3 or 4, 1 to 2 cm. long; spikelets solitary, about 1 mm. long, depressed-hemispheric, mostly glabrous.

Guatemala, Honduras, El Salvador, Costa Rica, Panama; moist open ground, along streams and ditches, in savannas and old fields, mostly at low altitudes, southern Mexico and the West Indies to Paraguay. Type from Porto Rico.

47. Paspalum jimenezii Chase, Contr. U. S. Nat. Herb. **28**: 159. *f. 101.* 1929.

Slender perennial in small tufts or loose mats; culms 10 to 30 cm. long; blades flat, 2 to 9 cm. long, 2 to 5 mm. wide, glabrous or nearly so; racemes 2 to 8, 1.5 to 4 cm. long; spikelets solitary about 1.5 mm. long, ovate-elliptic, glabrous.

Costa Rica (Guanacaste); known only from the type collection.

48. Paspalum hitchcockii Chase, Contr. U. S. Nat. Herb. **28**: 160. *f. 102.* 1929.

Glabrous creeping subaquatic perennial with ascending flowering branches 10 to 30 cm. tall, sometimes forming extensive colonies; blades flat, 5 to 13 cm. long, 4 to 9 mm. wide; racemes 2 or 3, relatively thick, 1.5 to 4 cm. long; spikelets solitary, about 1.8 mm. long, depressed-hemispheric, glabrous.

Panama (Chepo); margins of lagoons and ponds, at low altitudes. Panama and Colombia, whence the type.

49. Paspalum conjugatum Bergius, Act. Helv. Phys. Math. **7**: 129. *pl. 8.* 1762.

Extensively creeping perennial, with long leafy stolons and ascending flowering branches 20 to 50 cm. tall; blades flat, rather thin, 5 to 15 mm. wide, glabrous or sometimes pubescent; racemes 2, paired or nearly so, rarely a third below, widely divaricate, often arcuate, slender, 8 to 12 cm. long; spikelets solitary, 1.4 to 1.8 mm. long, flattened, ovate, pale yellow, glabrous except the silky-ciliate margin.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; a common weed in cultivated and waste ground, along ditches and roadsides, throughout the Tropics from sea level to 1,500 meters; found also in the Tropics of the Old World. Type from Dutch Guiana.

49a. Paspalum conjugatum pubescens Doell, in Mart. Fl. Bras. **2**^{2}: 55. 1877.

Differs in having pubescent blades, longer racemes, and larger spikelets (about 2 mm. long).

Guatemala, El Salvador, Panama; with the species, Mexico to Brazil, whence the type.

50. Paspalum dilatatum Poir, in Lam. Encycl. **5**: 35. 1804. DALLIS GRASS.

Rather stout perennial; culms 40 to 175 cm. tall, single, curved or decumbent at base; blades flat, elongate, 3 to 12 mm. wide; panicle erect or nodding, of usually 3 to 5 ascending or drooping racemes, 6 to 8 cm. long; spikelets 2.8 to 3.8 mm. long, ovate, pointed, fringed with silky hairs.

Guatemala, El Salvador, Costa Rica; low ground; a native of South America, now introduced in southern United States, the West Indies, and Central America, also in various parts of the Old World.

This species is known as paspalum and paspalum grass, more rarely as water-grass, and recently as Dallis grass. It has considerable value as a pasture grass, giving excellent late summer and autumn feed. Type from Buenos Aires.

51. Paspalum urvillei Steud. Syn. Pl. Glum. 1: 24. 1854.

Paspalum larrañagai Arech. Anal. Mus. Nac. Montevideo 1: 60, *pl. 2.* 1894.

Paspalum vaseyanum Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 17: 32. *f. 328.* 1899.

Stout erect perennial 75 to 250 cm. tall; blades flat, elongate, 3 to 15 mm. wide; panicle erect, 10 to 40 cm. long. of usually 12 to 18 racemes, the lower 7 to 14 cm. long, the upper gradually shorter; spikelets usually about 2.5 mm. long, ovate, abruptly pointed, copiously fringed with long silky white hairs.

Guatemala (Puerto Barrios); open ground in moist places, a native of South America, introduced in southern United States, Cuba, and Guatemala. Original locality unknown, probably southern Brazil.

This species, known in the southern United States as Vasey grass, is readily grazed while young and in some sections is cut for hay.

52. Paspalum fasciculatum Willd.; Flügge, Monogr. Pasp. 69. 1810.

Large extensively creeping leafy stoloniferous perennial, the glabrous compressed culms sometimes as much as 1 cm. thick and several meters long, the bases rooting at the nodes and forming a tangled mass, the stolons in open ground as much as 5 meters long, the erect flowering culms as much as 2 meters tall; blades flat, 1.5 to 3 cm. wide; panicles mostly flabellate in outline, of usually 12 to 20 racemes 10 to 15 cm. long, aggregate on a rather short axis; spikelets solitary, 4 to 4.5 mm. long, elliptic, more or less silky on the margin.

Guatemala, El Salvandor, Costa Rica, Panama; borders of streams, low ground and swamps, at low altitudes, southern Mexico to Ecuador and Argentina. Type from Brazil.

53. Paspalum virgatum L. Syst. Nat. ed. 10. 2: 855. 1759.

Robust leafy perennial in large dense erect clumps; culms simple, 1 to 2 meters tall; blades flat, elongate, 1 to 2.5 cm. wide, the margin scabrous; panicle slightly nodding, usually 15 to 25 cm. long, of about 10 to 16 thick ascending to drooping racemes, the lower 5 to 15 cm. long, the upper gradually shorter; spikelets crowded, 2.5 to 3 mm. long. obovate, puberulent, the margin toward the summit silky-pubescent.

Guatemala, El Salvador, Nicaragua, Costa Rica, Panama; open mostly moist or swampy ground, southern Texas, through Mexico and the West Indies to Brazil. Type from Jamaica.

54. Paspalum acutum Chase, Journ. Washington Acad. Sci. 17: 146. *f. 4.* 1927.

Robust perennial 1 to 2 meters tall; blades flat, folded at base, elongate, 14 to 18 mm. wide; racemes 6 to 10, heavy and thick, nodding, 8 to 12 cm. long on an axis 5 to 15 cm. long; spikelets 3.5 to 4 mm. long, elliptic, abruptly acute, silky-ciliate or nearly glabrous.

Panama (Canal Zone, whence the type); low open ground and along ditches. Panama and Brazil.

55. Paspalum plenum Chase, Contr. U. S. Nat. Herb. 28: 202. *f. 122.* 1929.

Robust leafy perennial in large clumps; culms simple, erect, 1 to 2.5 meters tall; blades elongate, flat, from a folded base, 1.5 to 2.5 cm. wide, sharply serrate; panicle nodding, 18 to 40 cm. long; racemes usually 40 to 80, drooping, the lower 12 to 15 cm. long, the upper gradually shorter, the rachis ciliate with stiff hairs 5 to 8 mm. long; spikelets crowded, 2.5 to 3 mm. long, obovate-elliptic, sparsely pubescent.

Guatemala, Costa Rica; wet open or brushy ground or in shallow water, up to 1,000 meters, southern Mexico, whence the type, to Colombia.

56. **Paspalum arundinaceum** Poir. in Lam. Encycl. Suppl. 4: 310. 1816.

Erect robust glabrous perennial in large clumps; culms simple, 1 to 2 meters tall; blades erect and folded at base, V-shaped above, as much as 1 meter long, 5 to 10 mm. wide, the margin very sharply serrulate, panicle of usually 12 to 18 rather thick ascending racemes 8 to 20 cm. long; spikelets crowded, about 2.5 mm. long, obovate-elliptic, glabrous.

Guatemala (Puerto Barrios); marshes and low open ground. West Indies to French Guiana, whence the type.

57. **Paspalum millegrana** Schrad. in Schult. Mant. 2: 175. 1824.

Robust erect or ascending perennial, glabrous as a whole, in large tough clumps; culms simple, 1 to 2 meters tall; lower sheaths reticulate in drying; blades firm, folded at base, flat above, elongate, 15 to 17 mm. wide, very sharply serrulate on the margin; panicle 6 to 30 cm. long, of usually 12 to 25 rather thick ascending or spreading approximate racemes 6 to 16 cm. long; spikelets irregularly crowded, 2 to 2.4 mm. long, obovate-suborbicular, glabrous.

Honduras, El Salvador; moist savannas, along ditches and in low open ground at low altitudes. Central America and the West Indies to Brazil, whence the type.

58. **Paspalum densum** Poir. in Lam. Encycl. 5: 32. 1804.

Erect robust perennial, glabrous as a whole, in large clumps; culms simple, 1 to 2 meters tall; lower sheaths spongy and succulent, reticulate in drying; blades firm, folded at base, V-shaped in cross-section above, elongate, 1 to 2 cm. wide; panicle 12 to 30 cm. long, elongate-pyramidal, of 50 to 100 or more racemes, the lower 5 to 9 cm. long and rather distant, the others successively shorter and more crowded; spikelets crowded, about 2 mm. long, suborbicular, glabrous.

Panama; marshes, wet savannas, ditches and low open ground or in shallow water, at low altitudes, West Indies to Brazil. Type from Porto Rico.

59. **Paspalum coryphaeum** Trin. Gram. Pan. 114. 1826.

Slender to robust leafy perennial, commonly glaucous-purplish, in tough clumps of few to many culms from short hard rhizomes; culms 1 to 4 meters tall, at first simple, erect or leaning, later freely branching; blades flat, 1 to 2 cm. wide, densely puberulent to nearly glabrous; panicles 10 to 25 cm. long; racemes 10 to 45, drooping, the lower 6 to 12 cm. long; spikelets 2 to 2.5 mm. long, elliptic, glandular-pubescent.

Panama (Alhajuela); savannas and campos, open or brushy slopes, river-banks and wood borders, Panama and Trinidad to Brazil, whence the type.

60. **Paspalum plicatulum** Michx. Fl. Bor. Amer. 1: 45. 1803.

Erect or ascending perennial, in tufts of few to several culms, with numerous leafy shoots at base; culms 50 to 100 cm. tall; sheaths keeled; blades mostly folded at the base, flat or folded above, elongate, 3 to 10 mm. wide; racemes usually 3 to 10, arcuate-spreading, 2 to 10 cm. long; spikelets usually about 2.5 mm. long, obovate-oval, turning brown at maturity, glabrous or appressed-pubescent, the sterile lemma with short transverse wrinkles just inside the slightly raised margin.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; open ground or wet wood borders, mostly in moist sandy or clay soil, southern United States to Argentina. Type from Georgia or Florida.

61. **Paspalum centrale** Chase, Journ. Washington Acad. Sci. 17: 145. *f.* 2. 1927.

A rather low perennial, in small to dense and spreading tufts; culms often branching at the lower nodes, 30 to 45 cm. long; blades flat, 10 to 20 cm. long,

5 to 7 mm. wide, pilose; racemes 2 to 6, spreading, often arcuate; spikelets mostly solitary, 2 to 2.3 mm. long, elliptic-obovate, brownish, glabrous.

El Salvador, whence the type, Nicaragua, Costa Rica, Panama; along ditches and in moist open ground near the coast, Central America.

62. **Paspalum convexum** Humb. & Bonpl. in Flügge, Monogr. Pasp. 175. 1810.

Tufted leafy annual branching at the base; culms suberect to geniculate-ascending, sometimes widely spreading, the flowering branches 20 to 40 cm. tall; blades flat, rather lax, 8 to 15 cm. long, 5 to 10 mm. wide, more or less pilose; racemes usually 2 or 3, thick, 2 to 4 cm. long; spikelets crowded, 2.2 to 3 mm. long, obovate-suborbicular, appressed-pubescent to glabrous.

Guatemala, Salvador, Nicaragua, Costa Rica, Panama; open ground, cultivated and waste places, Mexico, whence the type, to Brazil.

63. **Paspalum boscianum** Flügge, Monogr. Pasp. 170. 1810.

Rather succulent annual, branching at the base and commonly from the middle nodes, usually brownish purple; culms usually 40 to 60 cm. long, ascending or widely spreading; blades flat, mostly 15 to 30 cm. long and 8 to 10 mm. wide; racemes usually 4 to 11, 4 to 7 cm. long; spikelets crowded, about 2 mm. long, obovate, suborbicular, glabrous, brownish.

Guatemala, Panama; moist or wet open ground, along ditches and ponds, sometimes a weed in cultivated fields, southern United States to Porto Rico and Brazil. Type from South Carolina.

64. **Paspalum gardnerianum** Nees, Journ. Bot. Kew Misc. 2: 103. 1850.

Slender stiffly erect perennial, mostly in small tufts with a hard slightly enlarged densely woolly base; culms simple, 50 to 110 cm. tall; sheaths pubescent; bades flat or drying involute, 3 to 7 mm. wide; racemes usually 3 to 5, erect to arched-spreading, the lower 2.5 to 8 cm. long; spikelets crowded, about 1.7 mm. long, both glumes wanting, the pedicels bearing several stiff golden hairs longer than the spikelets.

Panama (Chorrera); savannas, campos, and open slopes, mostly on rather moist sandy or stony ground up to 1,300 meters altitude. Panama to Argentina. Type from Brazil.

65. **Paspalum pulchellum** Kunth, Mém. Mus. Hist. Nat. 2: 68. 1815.

Slender erect perennial; culms simple, nearly naked above, 25 to 75 cm. tall; lower sheaths short, much overlapping; blades flat, becoming involute; 1.5 to 4 mm. wide, more or less pilose; racemes usually 2, slender, 2 to 9 cm. long; spikelets solitary, not crowded, 1.7 to 2 mm. long, glabrous, both glumes wanting.

Guatemala (Cristina); sandy, mostly moist, savannas and pinelands at low altitudes, West Indies to Brazil. Type from Venezuela.

66. **Paspalum fimbriatum** H. B. K. Nov. Gen. & Sp. 1: 93, *pl. 28*. 1816.

An erect or suberect annual, branching at base; culms 25 to 100 cm. tall; blades flat, thin, 5 to 12 mm. wide, ciliate; racemes 3 to 8, rather broad, 2.5 to 8 cm. long; spikelets about 2.3 mm. long, with a broad firm notched wing.

Panama (Canal Zone); savannas, open and waste ground, mostly in moist places, West Indies to northern South America. Type from Colombia.

67. **Paspalum saccharoides** Nees in Trin. Gram. Icon. 1: *pl. 107*. 1827.

Robust branching perennial growing in tough clumps; culms 1 to 2 meters long, ascending to suberect, often decumbent or creeping at base, with erect branches; blades flat or involute in drying, 8 to 15 mm. wide; panicle subflabellate, feathery, composed of 30 to 50 slender silky drooping racemes 15 to 30 cm. long, on a relatively short axis; spikelets solitary, not crowded, 2.5 to 3 mm. long, lanceolate, acuminate, bearing a fringe of pale silky hairs 5 to 8 mm. long.

Costa Rica, Panama; open, brushy or jungly slopes, mostly in moist spots, up to 1,800 meters. Central America and the West Indies to Bolivia. Type from St. Christopher.

77. PANICUM L. Sp. Pl. 55. 1753

Spikelets more or less compressed dorsiventrally, arranged in open or compact panicles, rarely in racemes; glumes herbaceous, nerved, usually very unequal, the first often minute, the second typically equaling the sterile lemma, the latter of the same texture and simulating a third glume, bearing in its axil a membranaceous or hyaline palea and sometimes a staminate flower, the palea rarely wanting; fertile lemma chartaceous-indurate, typically obtuse, the nerves obsolete, the margins inrolled over an inclosed palea of the same texture. Annuals or perennials of various habit. Species probably about 500, mostly confined to the warmer regions of both hemispheres.

Basal leaves usually distinctly different from those of the culm, forming a winter rosette; culms at first simple, the spikelets of the primary panicle not perfecting seed, later usually becoming much branched, the reduced secondary panicles with cleistogamous, fruitful spikelets. Mostly rather delicate plants, with short blades and open panicles, the spikelets mostly ovoid or elliptic and usually not more than about 3 mm. long.

Foliage soft and lax, the flat blades prominently ciliate; plants branching from the base, finally forming rosettes or cushions.

Spikelets pubescent ..... 45. P. xalapense.

Spikelets glabrous ..... 46. P. strigosum.

Foliage not soft and lax; plants branching from the culm nodes.

Spikelets attenuate at base, mostly prominently pustulose; blades narrow, stiff, strongly nerved, tapering from base to apex; autumnal form often bushy-branched.

Autumnal blades flat ..... 47. P. angustifolium.

Autumnal blades involute.

Spikelets 3 to 3.5 mm. long, pointed ..... 48. P. fusiforme.

Spikelets about 2.5 mm. long, not pointed or obscurely so. 49. P. arenicoloides.

Spikelets 2 mm. long, very obtuse ..... 50. P. aciculare.

Spikelets not attenuate at base.

Sheaths villous or pubescent.

Sheaths and wiry culms minutely crisp puberulent ..... 56. P. lancearium.

Sheaths evidently pubescent.

Spikelets 3 mm. long ..... 59. P. albomaculatum.

Spikelets less than 3 mm. long.

Blades velvety-pubescent; vernal culms more than 75 cm. tall from a creeping base ..... 57. P. viscidellum.

Blades more or less villous; vernal culms less than 50 cm. tall.

Spikelets 2.3 mm. long; pubescence on blades spreading. 53. P. villosissimum.

Spikelets 2 mm. long; pubescence on blades not spreading. 52. P. olivaceum.

Sheaths glabrous.

Spikelets 1.5 mm. long ..... 55. P. albomarginatum.

Spikelets more than 1.5 mm. long.

Spikelets nearly spherical, 1.7 mm. long ..... 54. P. sphaerocarpon.

Spikelets elliptic, 2 mm. long ..... 51. P. multirameum.

Spikelets 3 mm. long ..... 58. P. joorii.

Basal leaves similar to the culm leaves, not forming a winter rosette; spikelets all fertile.
Plants annual.
Spikelets reticulate-veined at least near the apex; fruit transversely rugulose.
Spikelets glabrous----4. P. fasciculatum.
Spikelets pubescent----5. P. molle.
Spikelets not reticulate veined, fruit not transversely rugulose.
Blades ovate to elliptic; spikelets not more than 1.5 mm. long.
Spikelets pyriform, glabrous----39. P. pyrularium.
Spikelets elliptic, pubescent----34. P. trichoides.
Blades elongate; spikelets more than 1.5 mm. long.
First glume not more than one-fourth the length of the spikelet.
6. P. chloroticum.
First glume usually as much as half the length of the spikelet.
Panicle large, drooping----10. P. sonorum.
Panicle erect.
Inflorescence elongate, composed of approximate implicate panicles ----11. P. cayennense.
Inflorescence of a single erect spreading panicle.
Spikelets 3 mm. long; culms mostly less than 50 cm. tall.
9. P. hirticaule.
Spikelets 2 mm. long; culms mostly more than 1 meter tall.
14. P. hirsutum.
Plants perennial.
Spikelets short-pediceled along one side of the panicle branches, forming spikelike or 1-sided racemes.
Spikelets bearing on one side a pair of sessile glands, hispid.
Spikelets about 2 mm. long----29. P. pulchellum.
Spikelets about 3.5 mm. long----30. P. biglandulare.
Spikelets glandless, glabrous.
Blades lanceolate or ovate-lanceolate.
Blades not more than 5 cm. long----27. P. stoloniferum.
Blades 5 to 11 cm. long----28. P. frondescens.
Blades linear, often elongate.
Fruit transversely rugose.
Nodes bearded----3. P. barbinode.
Nodes glabrous.
Spikelets 3 mm. long; base of culms creeping and rooting
2. P. paludivagum.
Spikelets less than 2.5 mm. long; base of culms erect or decumbent----1. P. geminatum.
Fruit not rugose.
Culms 1 to 2 meters tall; panicle 20 to 40 cm. long
62. P. stagnatile.
Culms and panicles shorter.
Spikelets nearly sessile, densely arranged along one side of the pilose rachis.
Culms as much as 2 meters tall; panicles 25 to 30 cm. long
24. P. milleflorum.
Culms not more than 1 meter tall; panicles 5 to 15 cm. long
23. P. pilosum.

Spikelets in part on short branchlets on the lower side of the rachis.
Nodes pubescent---22. P. polygonatum.
Nodes glabrous.
Blades narrowed toward the base---26. P. laxum.
Blades somewhat cordate at base---25. P. boliviense.
Spikelets in open or sometimes contracted or congested panicles but not in 1-sided racemes.
Fruit transversely rugose.
Culms not thickened at base---15. P. maximum.
Culms with corms at base---16. P. bulbosum.
Fruit not rugose.
First glume not more than one-fourth as long as the spikelet.
Spikelets ovoid, bluntish, 1.5 to 2 mm. long.
Spikelets 1.5 mm. long---31. P. virgultorum.
Spikelets 2 mm. long.
Fruit sparsely silky---32. P. schiffneri.
Fruit smooth---33. P. parviglume.
Spikelets lanceolate, acute or acuminate.
Spikelets 4 to 5 mm. long; culms succulent, as much as 2 cm. thick---8. P. elephantipes.
Spikelets less than 4 mm. long; culms not succulent.
Spikelets sparsely appressed-pilose; first glume obscure.
64. P. tuerckheimii.
Spikelets glabrous; first glume well developed.
Culms decumbent, rooting at the nodes; spikelets 3 to 3.5 mm. long---7. P. aquaticum.
Culms erect from creeping rhizomes; spikelets 2.5 mm. long.
17. P. repens.
First glume more than one-fourth as long as the spikelet.
Blades narrowly elliptic, as much as 6 cm. wide in the middle.
63. P. grande.
Blades narrower.
Fruit crested at the apex; spikelets 5.5 to 6 mm. long.
65. P. zizanioides.
Fruit not crested.
Panicles narrow and few-flowered. Culms erect, wiry.
Spikelets 2 mm. long---20. P. stenodoides.
Spikelets 1.5 mm. long---21. P. stenodes.
Panicles many-flowered.
Panicles 40 to 60 cm. long, the numerous elongate branches in verticils---44. P. megiston.
Panicles mostly less than 40 cm. long, the branches not verticillate.
Primary panicles open, the secondary reduced, narrow, partly inclosed in the sheaths.
Plants glabrous or the leaves sparsely pilose.
60. P. cordovense.
Plants velvety-pubescent---61. P. pantrichum.
Primary and secondary panicles alike, or the secondary wanting.
First glume blunt or rounded, two-thirds the length of the spikelet or more; spikelets obtuse.

Panicles not more than 7 cm. long; plants somewhat glaucous, relatively small.
Spikelets 2 mm. long_____36. P. helobium.
Spikelets 1.5 mm. long.
Culms very slender, decumbent or creeping; blades 1 to 3 cm. long_____37. P. parvifolium.
Culms firm, erect or decumbent at base only; blades 3 to 8 cm. long_____38. P. cyanescens.
Panicles 10 to 20 cm. long, very diffuse; plants tall, not glaucous.
Spikelets viscid, 3 mm. long_____42. P. glutinosum.
Spikelets not viscid,, 2 mm. long____41. P. sellowii.
First glume acute or acuminate, usually less than two-thirds as long as the pointed spikelets.
Spikelets more or less hirsute.
Culms slender, branching and straggling; spikelets not turgid; glumes and sterile lemma hirsute along the margins_____40. P. haenkeanum.
Culms stout, erect or nearly so; spikelets turgid, sparsely hirsute_____43. P. rudgei.
Spikelets glabrous.
Spikelets 1.5 mm. long_____35. P. trichanthum.
Spikelets 3 to 4 mm. long.
Sheaths hirsute.
Spikelets about 4 mm. long____12. P. lepidulum.
Spikelets about 3 mm. long_13. P. ghiesbreghtii.
Sheaths glabrous.
Culms in a tangled mass at base, 2 to 4 meters tall, glaucous_____19. P. altum.
Culms erect, usually less than 2 meters tall 18. P. ichnanthoides.

1. Panicum geminatum Forsk. Fl. Aegypt. Arab. 18. 1775.

Paspalum appressum Lam. Tabl. Encycl. 1: 176. 1791.

Panicum appressum Lam.; Doell in Mart. Fl. Bras. 2 [2]: 184. 1877.

Paspalidium geminatum Stapf in Prain. Fl. Trop. Afr. 9: 583. 1920.

Perennial glabrous throughout; culms cespitose, 25 to 80 cm. tall, spreading from a decumbent base; blades 10 to 20 cm. long, 3 to 6 mm. wide, flat; panicle 12 to 30 cm. long, the racemes 12 to 18, erect, or nearly so, rather distant; spikelets glabrous, a little more than 2 mm. long.

Guatemala, El Salvador, Nicaragua, Costa Rica, Panama; moist ground, ditches and swamps, mostly near the coast. Tropical regions of both hemispheres. Type from Egypt.

2. Panicum paludivagum Hitchc. & Chase, Contr. U. S. Nat. Herb. 15: 32. *f. 13.* 1910.

Differs from *P. geminatum* in having a long creeping rooting base, papery and somewhat inflated sheaths, and larger spikelets (about 3 mm. long).

Guatemala; growing more or less submerged in fresh-water rivers and lakes of the interior up to 1,500 meters altitude. Southern United States and Mexico to Uruguay. Type from Florida.

3. Panicum barbinode Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 1: 256. 1834.

PARÁ GRASS.

Perennial sending out widely creeping stolons; culms decumbent at base, rooting at the lower nodes, 2 to 6 meters long or even more, sometimes ascend-

ing into bushes and trees; nodes densely villous; sheaths villous; blades 10 to 15 mm. wide; glabrous; panicle 12 to 20 cm. long, with several rather distant racemes; spikelets 3 mm. long, glabrous.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; cultivated and waste ground especially in moist places. Tropical America and the warmer parts of the Old World. Type from Bahia.

Commonly cultivated for forage and tending to spread along river banks often to the exclusion of other vegetation. Paraná grass.

This species has been erroneously referred to *P. molle* Swartz.

4. Panicum fasciculatum Swartz, Prodr. Veg. Ind. Occ. 22. 1788.

Panicum fuscum Swartz, Prodr. Veg. Ind. Occ. 23. 1788.

Annual, erect or spreading from a decumbent base, 30 to 100 cm. tall; sheaths glabrous or papillose-hispid; blades flat, 6 to 20 mm. wide, glabrous or sparsely hispid; panicle 10 to 20 cm. long, of several racemes 5 to 10 cm. long, solitary or fascicled along the main axis; spikelets 2 to 2.5 mm. long, bronze to yellow or brown, glabrous, pointed, reticulate-veined; first glume one-third as long as the spikelet.

Guatemala, British Honduras, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; moist open ground, often a weed in fields and along roadsides. Southern Florida and Texas to Argentina. Type from Jamaica.

5. Panicum molle Swartz, Prodr. Veg. Ind. Occ. 22. 1788.

Annual, resembling *P. fasciculatum* but more or less pubescent all over; spikelets about 3.5 mm. long, pilose.

Guatemala, El Salvador, Nicaragua, Costa Rica, Panama; open ground, often a weed in fields. Cuba, Jamaica, and Mexico to Argentina. Type from Cuba.

5a. Panicum didistichum Mez, Notizbl. Bot. Gart. Berlin 7: 63. 1917.

The type of this species (*Levy* 1124) from Grenada, Nicaragua, differs from *P. molle* in the slightly smaller more densely pubescent spikelets, more closely set on the rachis. It may be a peculiar, possibly diseased, form of *P. molle*.

6. Panicum chloroticum Nees; Trin. Gram. Pan. 236. 1826.

Glabrous annual, bluish green, prostrate or spreading; culms 30 to 60 cm. long; blades flat, abruptly pointed, 5 to 8 mm. wide, mostly not more than 10 cm. long; panicle about 10 cm. long and about as wide; spikelets glabrous, lanceolate, about 2.5 mm. long; first glume only about one-fourth the length of the spikelet, truncate or broadly triangular.

Panama; open ground. Panama to Argentina. Type from Brazil.

7. Panicum aquaticum Poir. in Lam, Encycl. Suppl. 4: 281. 1816.

Glabrous perennial; culms decumbent rooting at the nodes, 30 to 60 cm. long, blades 5 to 10 mm. wide, flat; panicle as in *P. chloroticum;* spikelets lanceolate, acuminate, 3 to 3.5 mm. long, the first glume one-fifth to one-fourth as long as spikelet.

Guatemala (Puerto Barrios); wet places or in shallow water, margins of streams and ponds, at low altitudes. Cuba, Porto Rico, whence the type, and Mexico to Paraguay.

8. Panicum elephantipes Nees, Agrost. Bras. 165. 1829.

Perennial; culms ascending from a decumbent, often widely creeping base, rooting at the nodes, succulent, as much as 2 cm. thick, a meter or more tall; blades flat, as much as 20 mm. wide; panicles large and open, as much as 40 cm. long, the short branchlets appressed along the ascending branches; spikelets 4 to 5 mm. long, lanceolate, acuminate, glabrous; first glume one-fifth to one-fourth the length of the spikelet, obtuse or acutish.

Guatemala; ponds and shallow water at low altitudes, sometimes in large colonies. Central America and the Greater Antilles to Argentina. Type from Brazil.

9. Panicum hirticaule Presl, Rel. Haenk. 1: 308. 1830.

Panicum flabellatum Fourn. Bull. Soc. Bot. France II. 27: 293. 1880.

Annual; culms erect, 15 to 70 cm. tall. glabrous or papillose-hispid, the nodes and sheaths hispid; blades flat, mostly glabrous or nearly so, 4 to 13 mm. wide; panicles 5 to 15 cm. long, open, usually reddish brown; spikelets about 3 mm. long, acuminate, glabrous; first glume half to three-fourths the length of the spikelet, acuminate.

El Salvador, Nicaragua, Costa Rica, Panama; rocky or sandy soil, at low and medium altitudes. Southwestern United States to Bolivia; also in Haiti. Type from Acapulco, Mexico.

10. Panicum sonorum Beal, Grasses N. Amer. 2: 130. 1896.

Annual; culms robust, erect or spreading, 60 to 100 cm. tall, the nodes pubescent; blades as much as 40 cm. long and 3 cm. wide, cordate-clasping at base; panicles large and more or less drooping, 20 to 30 cm. long, densely flowered; spikelets glabrous, lanceolate, about 3 mm. long.

El Salvador (San Salvador); native of the rich river valleys of northwestern Mexico, there cultivated by the Indians, probably introduced in El Salvador. Type from Sonora, Mexico.

11. Panicum cayennense Lam. Tabl. Encycl. 1: 173. 1791.

Annual; culms erect, often much branched at base, 20 to 50 cm. tall; sheaths and blades pilose, the latter 4 to 10 mm. wide; panicles terminal and axillary, open, 8 to 20 cm. long; spikelets a little more than 2 mm. long, obovoid, turgid, strongly nerved; first glume acute, half as long as the spikelet.

Honduras, Costa Rica, Panama; open ground. Central America and the Greater Antilles to Brazil. Type from Cayenne.

12. Panicum lepidulum Hitchc. & Chase, Contr. U. S. Nat. Herb. 15: 75. *f. 64*. 1910.

Perennial; culms erect, 25 to 70 cm. tall; sheaths hispid; blades 5 to 10 mm. wide; panicles open, 7 to 20 cm. long, half as wide; spikelets about 4 mm. long, acuminate, glabrous; first glume half as long as spikelet, acute.

Guatemala (Guatemala City); Nicaragua (Omotepe Island); Panama (Chepo); rocky hills and moist banks, Mexico, whence the type, to Panama.

13. Panicum ghiesbreghtii Fourn. Mex. Pl. 2: 29. 1886.

Perennial; culms erect, hispid, 60 to 80 cm. tall, the nodes and sheaths hirsute; blades elongate, flat, hirsute, about 1 cm. wide; panicle open, oblong, 20 to 30 cm. long; spikelets 3 mm. wide, glabrous, acute; first glume half as long as spikelet.

El Salvador, Nicaragua, Costa Rica, Panama; low moist ground, open ground and pastures. Mexico, whence the type, and the West Indies, to Brazil and Bolivia.

14. Panicum hirsutum Swartz, Fl. Ind. Occ. 1: 173. 1797.

Annual; culms robust, erect, as much as 1.5 meters tall and 1 cm. thick; sheaths hirsute with prickly fragile hairs; blades flat, mostly glabrous, 20 to 35 mm. wide; panicles open, densely flowered, 20 to 35 cm. long; spikelets about 2 mm. long, acute, glabrous; first glume half as long as spikelet.

Honduras, Costa Rica, Panama; open moist soil. Mexico and the West Indies to Brazil and Ecuador. Type from Jamaica.

15. Panicum maximum Jacq. Coll. Bot. 1: 76. 1786. GUINEA GRASS.

Panicum jumentorum Pers. Syn. Pl. 1: 83. 1805.

Perennial: culms cespitose, erect, 1 to 2.5 meters tall, glabrous, the nodes densely hirsute; sheaths hirsute or glabrous; blades flat, elongate, 1 to 3.5 cm. wide, glabrous except the margin, or hirsute on the upper surface near the base; panicle open, 20 to 50 cm. long, the lower branches in whorls; spikelets oblong, glabrous, about 3 mm. long; first glume one-third as long as spikelet; fruit transversely rugose.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; open ground, pastures, brushy slopes on dry soil at low altitudes; cultivated as a pasture grass and escaped, now widely established. Tropics of both hemispheres, a native of Africa. Type from Guadeloupe.

Zacate de guinea, zacate del barco, zacate barqueño.

16. Panicum bulbosum H. B. K. Nov. Gen. & Sp. 1: 99. 1816.

Panicum avenaceum H. B. K. Nov. Gen. & Sp. 1: 99. 1816.

Tufted perennial, 1 to 2 meters tall, the lowest internode of the culms thickened into a hard cormlike base 1 to 2 cm. thick; blades elongate, as much as 12 mm. wide; panicles open, 20 to 50 cm. long; spikelets acutish, 3.5 to 4 mm. long.

Guatemala (La Aurora); moist places in rocky canyons and valleys. Arizona to Guatemala, the type from Mexico.

17. Panicum repens L. Sp. Pl. ed. 2. 1: 87. 1762.

Perennial from extensively creeping rhizomes; culms erect, 30 to 80 cm. tall; blades 2 to 5 mm. wide; panicles open, 7 to 12 cm. long, the branches stiffly ascending, naked at the base; spikelets about 2.5 mm. long, glabrous; first glume one-fifth as long as spikelet, broad, truncate.

Nicaragua (without locality, *Flint*); sea beaches, extensively creeping, southern United States and Cuba to Brazil, and tropical regions of the Old World. Type from Spain.

18. Panicum ichnanthoides Fourn. Mex. Pl. 2: 30. 1886.

Panicum buchingeri **Fourn. Mex. Pl. 2: 30. 1886.**

Perennial in large clumps without creeping rhizomes, 1.5 to 2 meters tall; blades glabrous, 8 to 15 mm. wide; panicle large and open, 20 to 40 cm. long; spikelets 3.5 to 4 mm. long, glabrous, acute; first glume more than half as long as the spikelet, acute.

British Honduras (Manatee Lagoon); Honduras (Santa Ana); Nicaragua (Jinotepe); open rocky hillsides, at low and medium altitudes. Mexico, whence the type, to Nicaragua.

19. Panicum altum Hitchc. & Chase, Contr. U. S. Nat. Herb. 17: 488. *f.* 57. 1915.

Perennial in tangled masses, the culms decumbent and straggling at base, stout, reedlike, as much as 2 to 4 meters tall and 6 mm. thick, smooth and glaucous; blades flat, 8 to 15 mm. wide; panicles open, spreading, 20 to 30 cm. long; spikelets 3.5 to 4 mm. long, glabrous, acute; first glume acute, two-thirds as long as spikelet.

British Honduras, Costa Rica, Panama; sandy marshes or flats near the coast. Trinidad, Tobago. Type from Point Chamé, Panama.

20. Panicum stenodoides Hubb. Proc. Amer. Acad. 49: 497. 1913.

Perennial; culms in dense tufts, erect, slender, wiry, 20 to 40 cm. tall; blades erect, flat at base, involute toward the apex, 3 to 8 cm. long, 1 to 2 mm. wide, more or less papillose-pilose; panicles about 1 cm. long, narrow, bearing 3 to 7 spikelets about 2 mm. long; first glume half as long as the spikelet.

British Honduras (Ycacos Lagoon, the type), Costa Rica, Panama; open grassland and moist savannas. Trinidad.

21. Panicum stenodes Griseb. Fl. Brit. W. Ind. 547. 1864.

Perennial; culms in small tufts, slender and wiry, 25 to 50 cm. tall, erect or reclining; blades 1 to 4 cm. long, 1 to 2 mm. wide, involute; panicles 1 to 2 cm. long, 1 to 2 mm. wide; spikelets about 1.5 mm. long.

Guatemala, Costa Rica; borders of ponds and wet savannas at low altitudes. Central America and the West Indies to Brazil. Type from Jamaica.

22. Panicum polygonatum Schrad. in Schult. Mant. 2: 256. 1824.

Panicum bernoullianum Mez, Bot. Jahrb. Engler 56: Beibl. 125: 3. 1921.

Perennial; culms branching, widely spreading or creeping, as much as 100 cm. long, the nodes densely pubescent; blades 3 to 13 cm. long, 8 to 15 mm. wide, cordate; panicles 7 to 20 cm. long, the branchlets secund from the lower side of the branches, the rachises sparsely pilose with long weak hairs; spikelets 1.5 mm. long, pointed, glabrous.

Guatemala, Honduras, El Salvador, Costa Rica, Panama; swamps and moist soil along roadsides and in open woods. Mexico to Paraguay. Type from Brazil.

23. Panicum pilosum Swartz, Prodr. Veg. Ind. Occ. 22. 1788.

Panicum distichum Lam. Encycl. 4: 731. 1798.

Perennial; culms decumbent or creeping and rooting at the nodes, the branches and sometimes the main culms erect; nodes villous or sometimes glabrous; blades 4 to 20 cm. long, 7 to 15 mm. wide, broadest near the cordate or truncate base; panicles of 10 to 20 spikelike densely flowered racemes along an axis 5 to 15 cm. long, the racemes 1 to 3 cm. long, the rachis pilose; spikelets 1.5 mm. long, glabrous.

Guatemala, British Honduras, Honduras, Nicaragua, Costa Rica, Panama; moist ground, ditches, and swamps. Mexico and the West Indies to Paraguay. Type from Jamaica.

24. Panicum milleflorum Hitchc. & Chase, Contr. U. S. Nat. Herb. 17: 494. *f. 70.* 1915.

Differs from *P. pilosum* in its larger size, as much as 2 meters tall, in its longer blades, as much as 40 cm. long, in its longer panicles, as much as 35 cm. long, and in its slightly smaller spikelets, 1.3 mm. long.

Panama; swamps near the coast; also Trinidad. Type from Frijoles, Canal Zone.

25. Panicum boliviense Hack. Repert. Sp. Nov. Fedde 11: 19. 1912.

Panicum schiedeanum Mez, Bot. Jahrb. Engler 56: Beibl. 125: 4. 1921.

Perennial; culms decumbent, branching, as much as 1.5 meters long; nodes glabrous; blades flat, gradually narrowed from a cordate-clasping base, 8 to 15 cm. long, 1 to 2 cm. wide; panicle 10 to 25 cm. long, open; spikelets 1.5 mm. long, glabrous.

Guatemala (Cobán), Panama; ditches, banks of streams, moist open woodland. Southern Mexico and Cuba to Paraguay. Type from Bolivia.

26. Panicum laxum Swartz, Prodr. Veg. Ind. Occ. 23. 1788.

More or less spreading, often rooting at the nodes of the decumbent base, culms 40 to 100 cm. long; blades conduplicate or flat, 5 to 15 mm. wide, narrowed to a rounded or subcordate base; panicles oblong, 5 to 30 cm. long, composed of many slender, raceme-like branches, the lower distant, spreading, the upper ascending; branchlets mostly secund on the lower side of the branches, bearing 2 or 3 acutish spikelets 1 to 1.5 mm. long.

Guatemala, British Honduras, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; ditches, banks, moist woods and wet savannas. Mexico and the West Indies to Paraguay. Type from Jamaica.

27. Panicum stoloniferum Poir. in Lam. Encycl. Suppl. **4**: 274. 1816.

Perennial; plants creeping, branching, 10 to 50 cm. long; blades flat, 1 to 5 cm. long, 3 to 15 mm. wide; panicles 1 to 5 cm. long, with few to several racemes 5 to 10 mm. long; spikelets about 2.5 mm. long, glabrous.

Guatemala (Puerto Barrios), Honduras, Panama; moist shady places. Central America and the Lesser Antilles to Brazil. Type from Cayenne.

28. Panicum frondescens Meyer, Prim. Fl. Esseq. 56. 1818.

Panicum stoloniferum major Kunth, Rév. Gram. **2**: 389. 1831.

Panicum kegelii Steud. Syn. Pl. Glum. **1**: 65. 1854.

Hymenachne frondescens Fourn. Mex. Pl. **2**: 36. 1886.

Culms erect or ascending from a creeping base, 30 to 50 cm. tall; blades 5 to 11 cm. long, 12 to 20 mm. long, acuminate, glabrous; panicles 5 to 11 cm. long, with numerous approximate racemes 10 to 25 cm. long; spikelets about 2.7 mm. long, glabrous.

Guatemala, Costa Rica, Panama; swamps and wet places at low altitudes. Mexico to Brazil. Type from British Guiana.

29. Panicum pulchellum Raddi, Agrost. Bras. 42. 1823.

Hymenachne leptostachya Fourn. Mex. Pl. **2**: 36. 1886.

Perennial; culms spreading or creeping, branching, the nodes pubescent; blades thin, flat, 1.5 to 4 cm. long, 4 to 15 mm. wide; panicles oblong, 2 to 12 cm. long, the racemes 5 to 15 mm. long; spikelets about 2 mm. long, hispid, bearing on the sterile lemma 2 sessile glands.

Guatemala, British Honduras, Nicaragua, Costa Rica, Panama; moist shady places, southern Mexico and the Windward Islands to Brazil. Type from Brazil.

30. Panicum biglandulare Scribn. & Smith, U. S. Dept. Agr. Div. Agrost. Bull. **4**: 13. *pl. 4*. 1897.

Perennial; culms branching and spreading; blades 4 to 10 cm. long, 10 to 18 mm. wide, lanceolate, pilose; panicles 5 to 12 cm. long, the few distant racemes 1 to 2 cm. long; spikelets about 3.5 mm. long, hispid, pointed, the sterile lemma bearing 2 prominent sessile glands just above the middle; first glume less than one-third the length of the spikelet.

Guatemala (Cobán); among bushes. Also Mexico, the type from Chiapas.

31. Panicum virgultorum Hack. Oesterr. Bot. Zeitschr. **51**: 369. 1901.

Perennial; culms branching, creeping and straggling, the fertile ones as much as 1 meter long; blades 5 to 10 cm. long, 5 to 10 mm. wide, narrowly lanceolate, scabrous on the upper surface, smooth and glossy beneath; panicles 3 to 7 cm. long, the 2 to 4 branches ascending, compactly flowered except at base; spikelets about 1.5 mm. long, oval; first glume less than one-fourth the length of the spikelet; fruit oval, smooth, and shining but with sparse long appressed hairs.

Guatemala, Honduras, El Salvador, Costa Rica, Panama; hedge rows, bushy banks, and cultivated fields. Also Mexico. Type from Alajuelita, Costa Rica.

32. Panicum schiffneri Hack. Ergeb. Bot. Exped. Akad. Wiss. Südbras. 11. 1906.

Perennial, branching and rooting at the nodes; culms ascending 2 to 3 meters long; sheaths papillose-hispid; blades 10 to 15 cm. long, 12 to 25 mm. wide, scabrous; panicles 10 to 15 cm. long, the few slender scabrous branches re-

mote, the spikelets approximate along the upper part; spikelets glabrous, elliptic, about 2 mm. long; first glume less than one-fourth the length of the spikelet; fruit elliptic, 1.5 mm. long, sparsely silky.

Guatemala, El Salvador, Costa Rica, Panama; wet shady banks and slopes. Mexico, West Indies to Brazil, whence the type.

33. Panicum parviglume Hack. Oesterr. Bot. Zeitschr. **51**: 429. 1901.

Perennial; culms branching and straggling, the fertile ones as much as 1 meter long; blades lanceolate, 8 to 16 cm. long, 12 to 25 mm. wide, flat, sparsely hispidulous; panicles ovate, 15 to 25 cm. long, the branches 10 to 12 cm. long, the lower fourth naked; spikelets elliptic, glabrous, 2 mm. long; first glume one-fifth the length of the spikelet; fruit smooth.

Costa Rica (type from San José); banks and ditches. Also Mexico.

34. Panicum trichoides Swartz, Prodr. Veg. Ind. Occ. 24. 1788.

This species has been referred in some American floras to *P. brevifolium* L. of India.

Annual; culms erect or branched and spreading, the ascending ones 20 to 40 cm. long; sheaths papillose-hirsute; blades ovate or ovate-lanceolate, thin cordate, 2 to 6 cm. long, 1 to 2 cm. wide, glabrous or sparsely hirsute; panicles open and spreading, 5 to 20 cm. long, the branches and pedicels capillary; spikelets about 1.3 mm. long, elliptic, sparsely hirsute; first glume about half as long as the spikelet.

Guatemala, British Honduras, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; damp shady places, often a weed in fields and groves. Throughout tropical America, the type from Jamaica.

35. Panicum trichanthum Nees, Agrost. Bras. 210. 1829.

Panicum microspermum Fourn.; Hemsley, Biol. Centr. Amer. Bot. **3**: 492. 1885.

Perennial; culms branching and straggling, the ascending fertile ones 1 to 2 meters long; blades oblong-lanceolate, 10 to 15 cm. long, 10 to 15 mm. wide, cordate, rather strongly nerved; panicles 10 to 30 cm. long, open and spreading; spikelets about 1.5 mm. long, elliptic, acute; first glume less than one-fifth the length of the spikelet.

Guatemala, British Honduras, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; moist thickets and river banks. Mexico and the West Indies to Paraguay. Type from Brazil.

36. Panicum helobium Mez; Ekman, Ark. för Bot. **11**[4]: 23. *pl. 1, f. 6.* 1912.

Perennial, glabrous; culms branching and straggling, slender; blades oblong-lanceolate, 4 to 6 cm. long, 5 to 10 mm. wide, cordate-clasping; panicles 5 to 7 cm. long, open; spikelets glabrous, ovoid, 2 mm. long; first glume two-thirds as long as spikelet, acutish.

Costa Rica (Prov. San José); swampy woods, 1,500 to 1,800 meters. Also Brazil to Argentina, the type from Misiones.

37. Panicum parvifolium Lam. Tabl. Encycl. **1**: 173. 1791.

Panicum oplismenoides Nash, Bull. Torrey Club **30**: 381. 1903.

Perennial, more or less glaucous; culms branching and creeping, rooting at the nodes, the ascending fertile ones 20 to 80 cm. long; blades 1 to 3 cm. long, 2 to 6 mm. wide, oblong-lanceolate, rounded or subcordate, spreading or reflexed, glabrous; panicles open, loosely few-flowered, 2 to 4 cm. long; spikelets turgid, blunt, glabrous, 1.5 mm. long; first glume a little more than half the length of the spikelet.

Costa Rica (Buenos Aires); wet savannas and margins of ponds and streams. Costa Rica and the West Indies to Paraguay. Type from tropical America, the exact locality not known.

38. Panicum cyanescens Nees, Agrost. Bras. 220. 1829.

Perennial, bluish or glaucous; culms tufted, 30 to 50 cm. tall; blades flat, rather firm, erect to spreading or reflexed, 3 to 8 cm. long, 4 to 5 mm. wide, oblong-lanceolate, glabrous; panicles open, 3 to 6 cm. long; spikelets 1.5 mm. long, turgid or subglobose, obtuse, glabrous; first glume obtuse, two-thirds as long as spikelet.

British Honduras; swamps and wet savannas. Also Trinidad to Brazil, whence the type.

39. Panicum pyrularium Hitchc. & Chase, Contr. U. S. Nat. Herb. 17: 508. *f. 95.* 1915.

Annual; culms delicate, 10 to 13 cm. tall; blades thin, flat, spreading, 1 to 3 cm. long, 2 to 7 mm. wide, glabrous or sparsely pilose; panicles open, 2 to 5 cm. long; spikelets 1.5 mm. long, turgid, pyriform, attenuate at base, glabrous; first glume half as long as spikelet.

Panama (Chiriquí, the type). Also Venezuela and Colombia.

40. Panicum haenkeanum Presl, Rel. Haenk. 1: 304. 1830.

Panicum costaricense Hack. Oesterr. Bot. Zeitschr. **51**: 428. 1901.

Perennial; culms branching and straggling, the fertile ones as much as 1 meter tall; blades 5 to 10 cm. long, 6 to 12 mm. wide; panicles open, 10 to 15 cm. long, the branches and pedicels capillary; spikelets about 2.5 mm. long, elliptic, acute, rather strongly nerved, rather sparingly hirsute; first glume nearly half as long as the spikelet.

Honduras, Costa Rica, Panama; moist wooded or grassy banks and slopes. Mexico, whence the type, to Venezuela.

41. Panicum sellowii Nees, Agrost. Bras. 153. 1829.

Panicum lasianthum Trin. Gram. Icon. **3**: *pl. 245.* 1830.

Panicum puberulum Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 1: 277. 1834.

Perennial; culms branching and straggling, as much as 1 meter long; blades thin, ovate-lanceolate, 4 to 15 cm. long, 10 to 30 mm. wide, more or less pubescent or velvety; panicles open, 10 to 20 cm. long, the branches ascending or spreading, the spikelets somewhat appressed along the upper part; spikelets about 2 mm. long, obovate, obtuse, papillose-hispidulous; first glume about two-thirds as long as the spikelet.

Guatemala, Honduras, El Salvador, Costa Rica, Panama; damp woods and shady banks. Mexico and the West Indies to Paraguay. Type from Brazil.

42. Panicum glutinosum Swartz, Prodr. Veg. Ind. Occ. 24. 1788.

Perennial; culms erect from a geniculate or creeping and rooting base, 1 to 2 meters tall; blades elongate-lanceolate, acuminate, 15 to 50 cm. long, 15 to 25 mm. wide; panicles open, 15 to 30 cm. long, the lower branches verticillate, stiffly ascending; spikelets 3 mm. long, turgid, obovoid, obtuse, glabrous but viscid; first glume nearly as long as the spikelet.

Guatemala, Costa Rica; mountain woods, 500 to 2,000 meters. Mexico and the West Indies to Paraguay. Type from Jamaica.

43. Panicum rudgei Roem. & Schult. Syst. Veg. **2**: 444. 1817.

Panicum scoparium Rudge, Pl. Guian. **1**: 21. *pl. 29.* 1805. Not *P. scoparium* Lam. 1798.

Perennial; culms robust, 30 to 100 cm. tall, erect or somewhat geniculate; sheaths hirsute; blades thick, linear, 15 to 40 cm. long, 5 to 10 mm. wide, rather rigidly ascending, flat or folded, usually densely hirsute; panicles terminal and

lateral, forming an oblong inflorescence, open, the branches stiff, the pedicels divaricate; spikelets 3.5 mm. long, turgid, strongly nerved, sparsely hirsute; glumes and sterile lemma acuminate or abruptly pointed.

British Honduras, Costa Rica, Panama; savannas, at low and medium altitudes. Central America and Jamaica to Brazil. Type from British Guiana.

44. Panicum megiston Schult. Mant. **2**: 248. 1824.

Panicum altissimum Meyer, Prim. Fl. Esseq. 63. 1818. Not *P. altissimum* DC. 1817.

Perennial; culms robust, 1 to 2 meters tall; sheaths papillose-hispid; blades elongate, 1.5 to 3 cm. wide, glabrous; panicles 40 to 60 cm. long, the stiff main axis striate-angled, the branches in distant verticils, as many as 20 to 30 in a verticil; spikelets about 3.5 mm. long, globular-obovoid, glabrous; first glume less than one-third the length of the spikelet.

Costa Rica, Panama; swamps. Mexico, Cuba, and Trinidad to Paraguay. Type from British Guiana.

45. Panicum xalapense H. B. K. Nov. Gen. & Sp. **1**: 103. 1816.

Panicum ruprechtii Fourn. Mex. Pl. **2**: 21. 1886.

Vernal phase with slender culms 20 to 60 cm. tall, the nodes bearded with reflexed hairs; sheaths retrorsely pilose; blades 7 to 12 mm. wide, pilose on both surfaces; panicles 8 to 12 cm. long, open, few-flowered, the branches flexuous; spikelets 2 mm. long, obovate, obtuse, pilose. Autumnal phase branching at the base, forming soft prostrate tufts or rosettes.

Guatemala, Honduras, Nicaragua, Costa Rica; moist banks and open woods at low and medium altitudes. Eastern and southern United States and Mexico, whence the type, to Costa Rica; also Santo Domingo.

46. Panicum strigosum Muhl. in Ell. Bot. S. C. & Ga. **1**: 126. 1816.

Vernal phase with culms 5 to 30 cm. tall, the nodes pubescent; blades 3 to 6 cm. long, 3 to 8 mm. wide, ciliate and pilose; panicles 3 to 5 cm. long, open, the branches pilose; spikelets about 1.5 mm. long, glabrous. Autumnal phase a dense mat as in *P. xalapense.*

Guatemala, Costa Rica, Panama; sandy woods and open moist ground, at low and medium altitudes. Southeastern United States, Mexico, and the Greater Antilles to Colombia. Type from South Carolina.

47. Panicum angustifolium Ell. Bot. S. C. & Ga. **1**: 129. 1816.

Vernal phase erect, 30 to 50 cm. tall, the nodes glabrous, the lowest internodes crisp-pubescent; sheaths glabrous or the lower pubescent; blades 8 to 12 cm. long, 4 to 8 mm. wide, stiffly ascending, flat, long-acuminate; panicle open, few-flowered, 4 to 10 cm. long, the lower branches often reflexed; spikelets about 2.5 mm. long. Autumnal phase stiffly ascending or somewhat topheavy-reclining, the blades flat, rather thin and papery.

Nicaragua (San Rafael del Norte, 1,300 meters); sandy pine woods. Southeastern United States and Central America. Type from South Carolina.

48. Panicum fusiforme Hitchc. Contr. U. S. Nat. Herb. **12**: 222. 1909.

Vernal phase similar to that of *P. angustifolium;* spikelets about 3.5 mm. long. Autumnal phase similar but the blades soon involute.

British Honduras (Manatee Lagoon); sandy pine woods and open moist ground at low and medium altitudes. Southeastern United States, Central America, Cuba, whence the type, and Jamaica.

49. Panicum arenicoloides Ashe, Journ. Elisha Mitchell Soc. **16**: 89. 1900.

Vernal phase similar to that of *P. angustifolium;* spikelets about 2.5 mm. long. Autumnal phase similar but the blades becoming involute.

Guatemala, Honduras; sandy pine woods. Southeastern United States, Central America, and Cuba. Type from North Carolina.

50. Panicum aciculare Desv.; Poir. in Lam. Encycl. Suppl. **4**: 274. 1816.

Vernal phase similar to that of *P. angustifolium* but lower and more slender; spikelets about 2 mm. long, very obtuse. Autumnal phase bushy-branched, the blades involute.

Honduras (Dept. Copán, Dept. Comayagua); pine forest. Southeastern United States, Central America, and the West Indies. Type locality unknown.

51. Panicum multirameum Scribn. U. S. Dept. Agr. Div. Agrost. Circ. **19**: 2. 1900.

Vernal phase with erect or soon decumbent culms 30 to 60 cm. tall; nodes villous; ligule less than 1 mm. long; blades 3 to 6 cm. long, 3 to 6 mm. wide, glabrous; panicle ovoid, 3 to 6 cm. long; spikelets 2 mm. long, elliptic, finely pubescent. Autumnal phase decumbent and flabellately branching, the blades reduced, flat or somewhat rolled.

Guatemala (Cobán); banks and dry open ground at low and medium altitudes. Mexico, whence the type, and Jamaica to Venezuela.

52. Panicum olivaceum Hitchc. & Chase, Contr. U. S. Nat. Herb. **15**: 225. *f. 234*. 1910.

Vernal phase olive green; culms erect or decumbent at base, 20 to 40 cm. tall, pubescent; nodes bearded; sheaths pubescent; ligule 3 to 4 mm. long; blades 4 to 7 cm. long, 5 to 8 mm. wide, puberulent or villous; panicles 3 to 7 cm. long; spikelets about 2 mm. long, pubescent. Autumnal phase freely branching, decumbent-spreading, the reduced blades flat, usually conspicuously ciliate.

Guatemala, Honduras, Costa Rica, Panama; clay slopes and open ground at low and medium altitudes. Mexico to Venezuela and Colombia. Type from Cobán, Guatemala.

53. Panicum villosissimum Nash, Bull. Torrey Club **23**: 149. 1896.

Vernal phase light olive green; culms densely tufted, 25 to 45 cm. tall, these and the sheaths pilose with spreading hairs; ligule 4 to 5 mm. long; blades 6 to 10 cm. long, 5 to 10 mm. wide, long-pilose on both surfaces; panicles 4 to 8 cm. long; spikelets elliptic, pubescent, about 2.3 mm. long. Autumnal phase, decumbent or prostrate, with fascicled leaves and branchlets.

Guatemala (Guatemala City); dry open woods. Eastern United States, the type from Georgia and Central America.

54. Panicum sphaerocarpon Ell. Bot. S. C. & Ga. **1**: 125. 1816.

Panicum vicarium Fourn. Mex. Pl. **2**: 20. 1886.

Vernal phase light green; culms radiate-spreading, 20 to 50 cm. long, the nodes pubescent; sheaths glabrous; ligule obsolete; blades firm, 6 to 10 cm. long, 7 to 14 mm. wide, subcordate, rough on upper surface, smooth beneath, ciliate toward base; panicles 5 to 10 cm. long, the axis with viscid spots; spikelets nearly spherical, about 1.7 mm. long, puberulent. Autumnal phase prostrate-spreading, rather sparingly branching.

Guatemala, British Honduras, Honduras, Nicaragua, Costa Rica, Panama; sandy soil and gravelly banks at low and medium altitudes. Eastern United States and Mexico to Venezuela. Type from Georgia.

55. Panicum albomarginatum Nash, Bull. Torrey Club **24**: 40. 1897.

Vernal phase gray-green, glabrous or nearly so; culms erect, slender, 15 to 40 cm. tall; leaves mostly crowded at the base of the culm; ligule less than 1 mm. long; blades firm, 4 to 6 cm. long, 4 to 6 mm. wide, glabrous, the white cartilaginous margin rather prominent especially when dry; panicles 3 to 6 cm. long; spikelets 1.5 mm. long, pubescent. Autumnal phase finally a bushy tuft, with reduced branchlets, blades, and panicles.

Guatemala, Nicaragua; moist sandy woods, at low and medium altitudes. Southeastern United States, Central America, and Cuba. Type from Florida.

56. Panicum lancearium Trin. Gram. Pan. 223. 1826.

Vernal phase usually purplish; culms wiry, 20 to 50 cm. tall, minutely crisp-puberulent; blades 2 to 6 cm. long, 3 to 7 mm. wide, usually glabrous on the upper surface and puberulent beneath; panicles 3 to 6 cm. long; spikelets 2 mm. long, glabrous or puberulent. Autumnal phase geniculate-spreading, with fascicles of short branches.

British Honduras (Sibune River); sandy pine woods, at low altitudes. Southeastern United States, Central America, Cuba, and Dominican Republic. Type from North America, the exact locality not known.

57. Panicum viscidellum Scribn. U. S. Dept. Agr. Div. Agrost. Circ. 19: 2. 1900.

Vernal phase with culms ascending from a spreading or creeping base, villous; nodes bearded; sheaths villous; ligule 2 to 4 mm. long; blades velvety-pubescent, 5 to 13 cm. long, 9 to 13 mm. wide, subcordate; panicles 4 to 11 cm. long, rather densely flowered; spikelets about 2 mm. long sparsely pubescent.

Guatemala, Honduras, Nicaragua, Costa Rica, Panama; open woods and slopes, at low and medium altitudes. Mexico (the type from Jalapa), and Cuba to Colombia.

58. Panicum joorii Vasey, U. S. Dept. Agr. Div. Bot. Bull. 8: 31. 1889.

Vernal culms spreading or ascending from a decumbent base, glabrous, 20 to 50 cm. long; blades mostly 10 to 15 cm. long and 10 to 15 mm. wide, often somewhat falcate, glabrous; panicle 5 to 8 cm. long; spikelets about 3 mm. long, elliptic, pubescent. Autumnal phase widely spreading, branching, the ultimate branches in short dense fascicles.

Nicaragua (San Rafael del Norte); pine woods, southern United States to Nicaragua, the type from Louisiana.

59. Panicum albomaculatum Scribn. U. S. Dept. Agr. Div. Agrost. Circ. 19: 2. 1900.

Vernal phase 50 to 100 cm. tall from a knotty crown; sheaths puberulent, mottled with white spots; ligule less than 1 mm. long; blades 8 to 17 cm. long, 9 to 15 mm. wide, rounded and ciliate at base, glabrous or nearly so; panicles 10 to 16 cm. long; spikelets nearly 3 mm. long, elliptic, sparsely pubescent. Autumnal phase sparingly branching, the branches elongate, straggling.

Guatemala (Antigua); shady banks and wooded slopes at medium altitudes. Also Mexico, the type from Pátzcuaro.

60. Panicum cordovense Fourn. Mex. Pl. 2: 26. 1886.

Panicum expansum Fourn. Mex. Pl. 2: 26. 1886.

Ichnanthus apiculatus Scribn. U. S. Dept. Agr. Div. Agrost. Circ. 30: 1. 1901.

Panicum missionum Ekman, Ark. för Bot. 11 [4]: 19. *pl. 3. f. 1.* 1912.

Perennial; culms branching, tangled and straggling, widely creeping at base, as much as 2 m. long; sheaths papillose-pilose; blades thin, flat, 5 to 10 cm. long, 5 to 10 mm. wide, narrowly lanceolate, scabrous; panicles of two kinds, the primary loose and open, 10 to 15 cm. long, the secondary terminal on the branches, reduced, narrow, few-flowered, partially inclosed in the sheath; spikelets 3 to 3.5 mm. long, those of primary panicles usually glabrous, those of the secondary panicles usually pustulose-villous; first glume about two-thirds as long as the spikelet.

Costa Rica, Panama; shady banks and in deep woods, at medium altitudes. Mexico to Brazil and Bolivia. Type from Córdoba, Mexico.

61. Panicum pantrichum Hack. Verh. Zool. Bot. Ges. Wien **1915:** 72. March, 1915.

Panicum chiriquiense Hitchc. & Chase, Contr. U. S. Nat. Herb. 17: 527. *f. 138.* July, 1915.

Panicum protractum Mez, Notizbl. Bot. Gart. Berlin 7: 77. 1917.

Perennial, softly papillose-pilose throughout; culms branching and straggling, rooting at the lower nodes; blades 4 to 7 cm. long, 7 to 10 mm. wide; panicles open, 2.5 to 3.5 cm. long, or the primary one as much as 10 cm. long; spikelets about 2.7 mm. long, elliptic, pubescent or in primary panicles, the back of the sterile lemma or the whole spikelet glabrous; first glume three-fourths as long as the spikelet.

Panama (El Boquete, Chiriquí, 1,300 meters); shady places at medium altitudes. Panama to Brazil, whence the type, and Bolivia.

62. Panicum stagnatile Hitchc. & Chase, Contr. U. S. Nat. Herb. **17:** 528. *f. 141.* 1915.

Perennial; culms erect from a decumbent rooting base, 1 to 2 meters tall, about 5 mm. thick, glabrous, or the lower nodes appressed-pubescent; sheaths glabrous; blades flat, elongate, 1.5 to 3 cm. wide, glabrous; panicles 20 to 40 cm. long, about half as wide, the branches ascending bearing on the lower side the secondary branchlets; spikelets glabrous, acute, 1.8 mm. long; first glume acute, one-third as long as the spikelet.

Guatemala, Honduras, Panama; swamps, growing in the water, near the coast, gregarious. Mexico and Central America. Type from Frijoles, Canal Zone.

63. Panicum grande Hitchc. & Chase, Contr. U. S. Nat. Herb. **17:** 529. *f. 143.* 1915.

Panicum myrianthum Mez, Bot. Jahrb. Engler **56:** Beibl. 125: 3. 1921.

Perennial, gregarious, producing extensively creeping or floating leafy stolons about 5 mm. thick; culms 1.5 to 2 meters tall, the nodes densely hirsute; blades flat, as much as 1 meter long and 6 cm. wide, narrowed toward base and apex, glabrous, somewhat plicate; panicles as much as 60 cm. long and 40 cm. wide, open; spikelets 2.5 mm. long, pointed, glabrous.

Honduras, Nicaragua, Panama; lakes, ponds, and swamps, near the coast, growing in the water. Central America to Brazil. Type from Gatún Lake, Canal Zone.

64. Panicum tuerckheimii Hack. Allg. Bot. Zeitschr. **12:** 60. 1906.

Perennial; culms erect, 30 to 50 cm. tall; blades flat, 10 to 25 cm. long, 2 to 2.5 cm. wide, tapering at each end; panicles 15 to 20 cm. long, open; spikelets brown, 2.5 to 3 mm. long, acuminate, sparsely appressed-pilose; first glume minute, hyaline; second glume and sterile lemma equal, thin.

Guatemala (Cubilquitz, *Tuerckheim* 820, the type and only collection known); forest, 360 meters altitude.

65. Panicum zizanioides H. B. K. Nov. Gen. & Sp. 1: 100. 1816.

Panicum oryzoides Swartz, Prodr. Veg. Ind. Occ. 23. 1788. Not *P. oryzoides* Ard. 1764.

Acroceras oryzoides Stapf in Prain, Fl. Trop. Afr. 9: 622. 1920.

Perennial; culms decumbent and rooting at base, 50 to 100 cm. tall, glabrous; sheaths glabrous except margins; blades flat, 4 to 15 cm. long, 1 to 3 cm. wide, cordate-clasping, glabrous or rarely pubescent; panicles 10 to 25 cm. long, with a few ascending stiff branches 3 to 10 cm. long, bearing appressed branchlets; spikelets 5.5 to 6 mm. long, glabrous, abruptly short-pointed; first glume two-thirds as long as the spikelet.

Guatemala, Nicaragua, Costa Rica, Panama; moist usually shaded places, at low altitudes. Mexico and the Greater Antilles to Paraguay. Type from Colombia.

78. ICHNANTHUS Beauv. Ess. Agrost. 56. 1812

Inflorescence and spikelets as in *Panicum*, the first glume often nearly as long as the spikelets, the fruit acute or subacute, the margins of the lemma usually flat, the rachilla produced below the lemma into a minute stipe, this bearing on either side membranaceous appendages adnate to the base of the lemma and free above, the appendages often wanting and indicated by minute excavations only. In the Central American species the appendages are reduced to scars except in *I. standleyi*. Species about 35, tropical America; two species in the Tropics of the Old World.

Appendages evident, about 0.5 mm. long; some of the blades with petioles as much as 15 mm. long ..... 5. I. standleyi.
Appendages wanting; blades not petioled.
  Peduncles long and slender; blades thin, usually less than 5 cm. long and 1 cm. wide ..... 4. I. tenuis.
  Peduncles not long and slender; blades thicker and larger.
    Blades oval to ovate-lanceolate, firm, often scabrous on upper surface, often pubescent beneath ..... 2. I. axillaris.
    Blades ovate-lanceolate to elliptic-lanceolate, usually sparsely hispid on upper surface ..... 3. I. nemorosus.
    Blades lanceolate, mostly glabrous or nearly so ..... 1. I. pallens.

1. **Ichnanthus pallens** (Swartz) Munro; Benth. Fl. Hongk. 414. 1861.

Panicum pallens Swartz, Prodr. Veg. Ind. Occ. 23. 1788.

Culms much branched, spreading, creeping at the base, rooting at the nodes, the fertile culms ascending, 30 to 80 cm. long, puberulent; blades lanceolate, often somewhat falcate, 5 to 10 cm. long, 1 to 2 cm. wide, somewhat clasping at the asymmetric narrowed base, glabrous or nearly so, but more or less scaberulous on the upper surface; panicles terminal and from several of the upper axils, 5 to 10 cm. long, the spikelets appressed along the ascending branches; spikelets 3 to 3.5 mm., glabrous, the glumes and sterile lemma acuminate or more or less attenuate-pointed; appendages of fertile lemma reduced to scars.

Guatemala, Honduras, El Salvador, Costa Rica, Panama; shady banks and rich woods, tropical regions of America, at low and medium altitudes. Type from Jamaica.

Abnormal specimens occur in which the sterile lemmas are greatly multiplied, forming elongate curved spikelets as much as 2 cm. long.

2. **Ichnanthus axillaris** (Nees) Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 334. 1917.

Panicum axillare Nees, Agrost. Bras. 141. 1829.

Differing from *I. pallens* in the firmer broader blades (ovate or ovate-lanceolate), often very scabrous on the upper surface, cordate-clasping at base, larger panicles, and often sparsely pilose spikelets.

Guatemala, Honduras, Costa Rica, Panama; wet forests, thickets, and moist banks, at low altitudes. Central America and the West Indies to Brazil, whence the type, and Ecuador.

3. **Ichnanthus nemorosus** (Swartz) Doell in Mart. Fl. Bras. 2[3]: 289. 1877.

Panicum nemorosum Swartz, Prodr. Veg. Ind. Occ. 22. 1788.

Differing from *I. pallens* in the more prostrate habit, thinner, usually proportionately broader, sparsely pilose blades and the blunter spikelets.

Guatemala, El Salvador, Costa Rica, Panama; moist forest and shady banks, up to about 2,000 meters. Mexico and the West Indies. Type from Jamaica.

4. **Ichnanthus tenuis** (Presl) Hitchc. & Chase, Contr. U. S. Nat. Herb. **18**: 334. 1917.

Oplismenus tenuis Presl, Rel. Haenk. 1: 319. 1830.
Panicum alsinoides Griseb. Fl. Brit. W. Ind. 550. 1864.
Ichnanthus alsinoides Munro; Hemsl. Biol. Centr. Amer. Bot. 3: 500. 1885.

Apparently annual; culms slender, spreading or creeping, rooting at the nodes, much branched, the fertile shoots ascending, 10 to 20 cm. high; blades lanceolate, 2 to 5 cm. long, 4 to 10 mm. wide, thin, glabrous or puberulent; panicles terminal and axillary, 2 to 4 cm. long, mostly on long slender peduncles; spikelets narrowly lanceolate, 3 mm. long, acuminate, hispid.

Costa Rica, Panama; damp shady places, at low and medium altitudes. Central America and Trinidad to Colombia. Original localities given as Mexico and Panama, but the former is probably an error as the species has not been observed in Mexico.

5. **Ichnanthus standleyi** Hitchc., sp. nov.

Apparently perennial; culms slender, spreading, branching, minutely pubescent; sheaths rather sparingly pubescent, villous on the margin; ligule very short, densely ciliate; blades ovate-lanceolate, somewhat acuminate-pointed, sparingly hispid on both surfaces, scabrous on the margin, 4 to 6 cm. long, 1 to 2 cm. wide, often petioled, the petiole slender, as much as 15 mm. long; inflorescence long-exserted, consisting of 2 to 5 racemes, 1 to 2 cm. apart and 5 to 10 mm. long, finally more or less reflexed; spikelets dark-purple, about 5 mm. long; glumes about as long as the spikelet, acuminate, sparsely hispidulous, pilose on the margins; sterile lemma similar to the glumes but less acuminate; fertile lemma white, elliptic, about 3.5 mm. long, the wings or appendages evident but minute, about 0.5 mm. long.

Type in the U. S. National Herbarium, no. 1,387,083, collected on wet shaded bank in the vicinity of Siguatepeque, Department of Comayagua, Honduras, altitude 1,080 to 1,400 meters, February 14 to 27, 1928, by Paul C. Standley (no. 56207).

The material of this specimen is meager and fragmentary; hence the description may require modification when more specimens are at hand. The racemose inflorescence is not common in the genus. The petioled blades are peculiar. In this respect the species resembles *I. mayarensis* (Wright) Hitchc. of Cuba, in which the blades are much smaller and narrower, and *I. lanceolatus* Scribn. & Smith, also with racemes but with larger lanceolate blades and smaller spikelets.

79. **LASIACIS** (Griesb.) Hitchc. Contr. U. S. Nat. Herb. **15**: 16. 1910

(*Panicum* section *Lasiacis* Griseb. Fl. Brit. W. Ind. 551. 1864)

Spikelets subglobose, placed obliquely on their pedicels; first glume broad, somewhat inflated-ventricose, usually not more than one-third the length of the spikelet; second glume and sterile lemma about equal, broad, abruptly apiculate, papery-chartaceous, shining, many-nerved, glabrous, or lanose at the apex only, the lemma inclosing a membranaceous palea and sometimes a staminate flower; fertile lemma white, bony-indurate, obovoid, obtuse, this and the palea of the same texture bearing at the apex in a slight crateriform depression a tuft of woolly hairs, the palea concave below, gibbous above, the apex often free at maturity. Large branching perennials, with usually woody culms often clambering several feet high into shrubs or trees, the blades firm, flat, usually

lanceolate and narrowed into a petiole, the spikelets in an open panicle. Species about 20, in the American tropics.

Culms erect, simple, herbaceous; blades as much as 40 cm. long and 5 cm. wide, deeply cordate-clasping ---------- 1. L. procerrima.

Culms much branched, woody; blades mostly less than 20 cm. long, narrowed at base or somewhat cordate.

Main stem prostrate, the fertile shoots ascending or erect--2. L. grisebachii.

Main stems clambering, the branchlets in whorls at the nodes, or much branched and straggling, forming a tangled mass.

Ligule noticeable, brownish, 2 to 5 mm. long.

Panicles ovoid, rather densely flowered, 5 to 6 cm. long, the branches short---------- 3. L. scabrior.

Panicles narrow or open, more than 8 cm. long, the long branches naked below, the spikelets clustered toward the upper part.

Sheaths glabrous; blades more than ten times as long as wide; branches of panicle spreading---------- 4. L. oaxacensis.

Sheaths hispidulous or glabrate; blades less than ten times as long as wide; branches of panicle ascending or somewhat appressed. 5. L. standleyi.

Ligule inconspicuous, hidden within the mouth of the sheath, rarely as much as 1 mm. long.

Plants not high-climbing, decumbent and rootng at base, forming a tangled mass with no strong central cane; spikelets clustered toward the ends of the branches---------- 6. L. rhizophora.

Plants high-climbing, forming a strong central cane; spikelets not clustered toward the ends of the branches.

Panicles small and narrow; main culm papillose-hispid. 7. L. leptostachya.

Panicles open, or if compact not small and narrow; main culm not papillose-hispid.

Primary panicle few-flowered, 5 to 10 cm, long. Plants glabrous throughout; branches sharply xigzag, the branchlets of the panicle strongly divaricate or reflexed; blades narrowly lanceolate, firm, mostly less than 1 cm. wide on fertile shoots. 8. L. divaricata.

Primary panicle many flowered, usually 15 to 25 cm. long or more.

Blades glabrous on both surfaces.

Spikelets 4.5 to 5 mm. long, on short, stiff appressed pedicels, blades oblong-ovate or elliptic-lanceolate----9. L. sloanei.

Spikelets 3.5 to 4 mm. long, on flexuous spreading pedicels; blades lanceolate or narrowly lanceolate-10. L. patentiflora.

Blades pubescent on one or both surfaces (sometimes glabrous in *L. ruscifolia* with ovate-lanceolate blades and compact panicles).

Blades narrowly lanceolate, averaging 8 to 10 times as long as wide; panicles large and open; spikelets 4 to 5 mm. long---------- 11. L. sorghoidea.

Blades ovate-lanceolate or elliptic, sometimes lanceolate, often more or less cordate-clasping; panicle often compact, or at least the branches commonly compactly flowered; spikelets 3 to 4 mm. long---------- 12. L. ruscifolia.

1. Lasiacis procerrima (Hack.) Hitchc. Proc. Biol. Soc. Washington **24:** 145. 1911.

Panicum procerrimum Hack. Oesterr. Bot. Zeitschr. 51: 431. 1901.

Culms several in a clump, succulent, somewhat woody at base but not perennial, erect from a thick woody crown, simple, as much as 4 meters tall and 1 cm. thick, glabrous, glaucous; blades narrowly lanceolate, 15 to 40 cm. long, 2 to 5 cm. wide, deeply cordate-clasping; panicles open and much branched, as much as 1 meter long, the branches naked below, finally widely spreading, the lower in whorls, as much as 40 cm. long; spikelets 3 to 4 mm. long, ovoid or elliptic.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; thickets, banks, and open ground, at low and medium altitudes. Mexico to Venezuela. Type from vicinity of San Jose, Costa Rica.

2. Lasiacis grisebachii (Nash) Hitchc. Bot. Gaz. **51:** 302. 1911.

Panicum grisebachii Nash, Bull. Torrey Club **35:** 301. 1908.

Plants much branched, the main culms creeping and rooting at the nodes, as much as 2 mm. in diameter, the fertile shoots erect or ascending, 20 to 40 cm. tall; ligule inconspicuous; blades narrowly lanceolate, 6 to 12 cm. long, 5 to 10 mm. wide, puberulent beneath, glabrous above; panicles ovate, mostly 5 to 6 cm. long, the few branches rather stiffly ascending, few-flowered; spikelets 4 mm. long.

Honduras (Puerto Sierra); rich moist thickets at low altitudes. Also Mexico, and Cuba, the type from Madruga.

3. Lasiacis scabrior Hitchc. Proc. Biol. Soc. Washington **40:** 85. 1927.

Culms climbing or straggling, woody, as much as 3 meters tall, pubescent or glabrescent; sheaths more or less hispidulous, densely villous on the margin; ligule prominent, brown, mostly 3 to 5 mm. long; blades rather firm, elliptic-lanceolate, mostly 8 to 12 cm. long and 1 to 1.5 cm. wide, harshly scabrous on the upper surface, puberulent beneath; panicles not much exserted, ovoid, rather densely flowered, mostly 5 to 6 cm. long, sometimes as much as 10 cm., the branches spreading, or the lower finally reflexed, the axis and branches pubescent; spikelets ovoid, pale, about 4 mm. long.

Guatemala (Cubilquitz, the type), Nicaragua, Costa Rica, Panama; wet forest at low and medium altitudes (up to about 1,000 meters).

This species resembles *L. ligulata* Hitchc. & Chase, of the West Indies and South America, in the long ligule but differs in the thick blades scabrous above, the hispid sheaths, and the compact panicle.

4. Lasiacis oaxacensis (Steud.) Hitchc. Proc. Biol. Soc. Washington **24:** 145. 1911.

Panicum oaxacense Steud. Syn. Pl. Glum. 1: 73. 1854.

Straggling and branching, but not high-climbing nor with a strong central cane; culms decumbent and geniculate at base, rooting at the lower nodes, the ascending branches 1 to 2 meters long, glabrous; sheaths glabrous or rarely appressed-pubescent, the margin villous; ligule prominent, 2 to 5 mm. long, brownish; blades narrowly lanceolate, 10 to 25 cm. long, 1 to 2 cm. wide, abruptly narrowed at base, long-tapering at apex, scabrous on both surfaces, panicles open, as much as 30 cm. long and nearly as wide, the slender scabrous branches and branchlets ascending or the lower finally spreading, naked below, the spikelets clustered toward the tips, no smaller secondary panicles developed; spikelets 4 mm. long, elliptic, often purple.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; thickets and copses at low and medium altitudes. Mexico to Ecuador. Type from Oaxaca.

5. Lasiacis standleyi Hitchc. Proc. Biol. Soc. Washington 40: 86. 1927.

Culms branching and straggling, mostly 1 to 2 meters tall, rooting at the nodes with slender branching stilt roots; sheaths glabrous or hispidulous; ligule prominent, brown, 3 to 5 mm. or even 8 mm. long; blades narrowly elliptic-lanceolate, 10 to 15 cm. long, 1 to 2.5 cm. or rarely 3 cm. wide, somewhat falcate, scabrous on the upper surface, minutely pubescent beneath; panicles 10 to 15 cm. long, the few branches stiffly ascending, the spikelets somewhat clustered toward the ends of the scabrous branches and branchlets; spikelets ovoid-globular, pale or finally dark, about 4 mm. long.

Costa Rica (La Tejona, Prov. Guanacaste, the type); moist forest.

The species has the habit and panicle of *L. rhizophora* but differs in the long ligule and narrower blades.

6. Lasiacis rhizophora (Fourn.) Hitchc. Proc. Biol. Soc. Washington 24: 145. 1911.

Panicum rhizophorum Fourn. Mex. Pl. 2: 31. 1886.

Branching and straggling, not forming a strong central cane, decumbent at base and rooting at the lower nodes, the fertile culms ascending, 30 to 100 cm. long, glabrous or pubescent; sheaths appressed-hispidulous or glabrescent, villous on the margin; ligule inconspicuous; blades lanceolate to ovate-lanceolate, 7 to 14 cm. long, 1.5 to 3 cm. wide, somewhat cordate at base, rather abruptly narrowed above to an acuminate point, scabrous above, pubescent or scabrous beneath; panicles 8 to 15 cm. long, the branches stiffly ascending, naked below, the spikelets clustered toward their tips, the axes scabrous; spikelets 3 to 4 mm. long, ovoid.

Guatemala, Costa Rica; copses and moist forest, at medium altitudes (500 to 2,000 meters). Also Mexico, the type from Orizaba.

7. Lasiacis leptostachya Hitchc. Contr. U. S. Nat. Herb. 22: 19. 1920.

Plants forming a stout central cane, with numerous slender branches at the nodes, clambering to the height of several meters; main culms roughened and somewhat cinereous with papillae and irregularly appressed hairs; floral branchlets slender, conspicuously zigzag, smooth, 20 to 40 cm. long; sheaths glabrous or nearly so, densely long-ciliate on the margin, hirsute on the collar; ligule inconspicuous, about 0.5 mm. long; blades narrowly lanceolate, 7 to 10 cm. long, 5 to 10 mm. wide, narrowed toward each end, glabrous on both surfaces; panicles small and narrow, rather dense, 2 to 4 cm. long, few-flowered; spikelets about 5 mm. long, oblong-ovoid, pale.

Nicaragua (*Jinotepe*, the type); jungle. Known only from the type locality.

8. Lasiacis divaricata (L.) Hitchc. Contr. U. S. Nat. Herb. 15: 16. 1910.

Panicum divaricatum L. Syst. Nat. ed. 10. 2: 871. 1759.

Usually glabrous throughout except the margin of the sheaths; culms woody, much branched, clambering over shrubs to the height of 3 to 4 meters, the main culm strong, as much as 6 mm. in diameter, the main branches often fascicled, the vigorous secondary sterile shoots usually strongly divaricate or zigzag; sheaths sometimes hispid on the collar; ligule inconspicuous; blades narrowly lanceolate, 5 to 12 cm. long, 5 to 15 mm. wide, or on the vigorous sterile shoots much larger, narrowed at the base, gradually acuminate, scabrous on the margin and sometimes slightly on the surface, the older ones deciduous from the sheaths, the basal portion of the fertile shoots bearing the old sheaths but otherwise naked; panicles terminating the main culm and the fertile branches, ovate or oblong, 5 to 20 cm. long, loosely flowered, the branches distant, spreading, or often reflexed, the axes angled, scabrous, flexuous, the lower usually 2 to 4 cm. (sometimes as much as 10 cm.) long, the main branches ordinarily 5 to 10 flowered; spikelets ovoid, about 4 mm. long.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; copses and borders of forest, up to about 500 meters. Southern Florida, Mexico, and the West Indies to Argentina. Type from Jamaica.

9. Lasiacis sloanei (Griseb.) Hitchc. Bot. Gaz. 5: 302. 1911.

Panicum latifolium Hamilt. Prodr. Pl. Ind. Occ. 10. 1825. Not *P. latifolium* L. 1753.

Panicum sloanei Griseb. Fl. Brit. W. Ind. 551. 1864.

Climbing to a height of 3 or 4 meters, forming a strong central cane; culms glabrous; branches solitary or two or three together, elongate; sheaths glabrous except the margin, the collar conspicuously villous; ligule inconspicuous; blades oblong-ovate or elliptic-lanceolate, 10 to 15 cm. long, 2.5 to 4 cm. wide, those of the branches smaller, narrowed at the asymmetric base, abruptly acuminate, somewhat papery in texture when dry, glabrous on both surfaces or scabrous above, scabrous on the margin; panicles open and usually loosely few-flowered, 10 to 20 cm. long, the branches distant and widely spreading, the lower as much as 10 cm. long, flexuous, scaberulous; spikelets 4 to 5 mm. long, elliptic.

Nicaragua (Jinotepe); Costa Rica (Turrialba); climbing among bushes and small trees, at low altitudes (up to about 500 meters). Mexico and the West Indies to Colombia. Type from Jamaica.

10. Lasiacis patentiflora Hitchc. & Chase, Contr. U. S. Nat. Herb. **18**: 338. 1917.

High-climbing with a strong central cane as much as 8 mm. thick, glabrous throughout except at the summit of the sheaths; branches numerous, solitary, widely spreading and finally repeatedly branching; sheaths with a ring of hairs at the summit or at least a tuft of hairs on either side, sometimes pubescent on the margins toward the summit; ligule about 0.5 mm. long; blades on vigorous shoots as much as 14 cm. long, and 2.5 cm. wide, but mostly about 8 to 12 cm. long and 1.5 to 2 cm. wide, acuminate, rounded-tapering to the base, usually somewhat asymmetric, glabrous, scabrous on the margin and somewhat so on both surfaces; panicles numerous, mostly 12 to 20 cm. long, nearly as wide, the slender axis and distant spreading flexuous branchlets angled, scabrous, the pedicels flexuous, spreading; spikelets pale, blotched with dark blue or purple at maturity, 3.4 to 3.8 mm. long, globose-obovoid.

El Salvador (San Salvador), Nicaragua (Jinotepe); borders of woods and jungles. Central America and the West Indies to British Guiana. Type from Tobago.

11. Lasiacis sorghoidea (Desv.) Hitchc. & Chase, Contr. U. S. Nat. Herb. **18**: 338. 1917.

Panicum sorghoideum Desv.; Hamilt. Prodr. Pl. Ind. Occ. 10. 1825.

Culms much branched, erect or clambering to a height of 5 to 7 meters, the strong central cane as much as 1 cm. thick, glabrous or pubescent, the main branches sometimes 1 meter long or more, bearing slender branchlets toward the pendent ends, or the branchlets fascicled on the main culm; young shoots usually pubescent; sheaths pubescent, especially on the margin and collar, the surface sometimes glabrate; ligule inconspicuous; blades lanceolate or elliptic-lanceolate, those of the main culm or of vigorous shoots as much as 20 cm. long and 3 cm. wide, those of the fertile branches usually 8 to 12 cm. long and 1.5 cm. wide, on the fascicled branchlets smaller, often falcate, velvety on both surfaces or puberulent to glabrate above; panicles on the main culm and larger branches usually 10 to 20 cm. long, at maturity as wide or wider, rather compactly many-flowered; spikelets 4 to 5 mm. long.

Guatemala, El Salvador, Nicaragua, Costa Rica, Panama; ravines, hedges, copses, and borders of woods, at low and medium altitudes. Mexico and the West Indies to Argentina and Bolivia. Type from Porto Rico.

12. Lasiacis ruscifolia (H. B. K.) Hitchc. Proc. Biol. Soc. Washington **24**: 145. 1911.

Panicum ruscifolium H. B. K. Nov. Gen. & Sp. 1: 101. 1816.

Panicum compactum Swartz, Adnot. Bot. 14. 1829.

Lasiacis compacta Hitchc. Bot. Gaz. 51: 302. 1911.

More robust than any other species, freely branching, the shoots usually strongly dorsiventral; culms becoming several meters long, glabrous or rarely puberulent; sheaths sometimes hispidulous toward the apex (in some Central American specimens papillose-hispid throughout), glabrous or often ciliate or villous on the margin, especially near the summit, the collar glabrous or villous; ligule inconspicuous; blades ovate-lanceolate or elliptic, sometimes lanceolate, the primary ones 10 to 15 cm. long, 3 to 6 cm. wide, narrowed or often cordate-clasping at the asymmetric base, rather abruptly narrowed to an acuminate but not attentuate apex, puberulent or glabrous beneath, glabrous or scabrous above, the secondary blades similar or reduced; panicles 5 to 20 cm. long, narrow and compact, rarely somewhat open, with spreading, implicate but rather closely flowered branches; spikelets 3 to 4 mm. long, nearly globose at maturity. This species is variable as to pubescence, many Central American specimens having glabrous blades.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; climbing over bushes, at low altitudes (up to 500 meters). Mexico, whence the type, and the Greater Antilles to Peru.

80. SACCIOLEPIS Nash in Britton, Man. 89. 1901

Spikelets oblong-conic; first glume small, much shorter than the spikelet; second glume broad, inflated-saccate, strongly many-nerved; sterile lemma narrower, flat, fewer nerved, its palea nearly as long, often subtending a staminate flower; fertile lemma stipitate, elliptic, chartaceous-indurate, the margins inrolled, the palea not inclosed at the summit. Annuals or perennials, of wet soil, usually branching, the inflorescence a dense, usually elongate, spikelike panicle. Species about 30 in the Tropics of both hemispheres.

1. Sacciolepis myuros (Lam.) Chase, Proc. Biol. Soc. Washington **21**: 7. 1908.

Panicum myuros Lam. Tabl. Encycl. 1: 172. 1791.

Panicum myosurus L. Rich. Act. Soc. Hist. Nat. Paris 1: 106. 1792.

Hymenachne myuros Beauv. Ess. Agrost. 49, 165. 1812.

Panicum phleiforme Presl, Rel. Haenk. 1: 302. 1830.

Slender glabrous annual as much as 1 meter tall, with elongate linear blades, the panicles compact, spikelike, about 5 mm. thick; spikelets about 2 mm. long.

Honduras, Panama; marshes and wet places at low altitudes. Mexico and Cuba to Brazil and Bolivia. Type from Cayenne.

81. HYMENACHNE Beauv. Ess. Agrost. 48. *pl. 10. f. 8.* 1812

Spikelets acuminate, short-pedicellate in long dense spikelike or interrupted panicles; first glume one-third to half as long as the spikelet, remote, a distinct stipe below the second glume; sterile lemma 5-nerved, acuminate, exceeding the lanceolate stramineous fruit; lemma and palea membranaceous, the margins of the lemma thin (not broad and hyaline), not inrolled; palea not inclosed above.

Perennial aquatics or semiaquatic, decumbent at base and rooting at the lower nodes, with rather stout simple stems and long lanceolate usually cordate-clasping blades; species about 8 in tropical regions.

Inflorescence dense, spikelike----------1. H. amplexicaulis.
Inflorescence long and narrow with ascending branches, not spikelike
2. H. donacifolia.

1. Hymenachne amplexicaulis (Rudge) Nees, Agrost. Bras. 276. 1829.

Panicum amplexicaule Rudge, Pl. Guian. 1: 21. *pl. 27*. 1805.

Glabrous aquatic perennial with succulent sparingly branching culms; blades 20 to 35 cm. long, 2 to 3 cm. wide, cordate-clasping; panicles about 8 mm. thick and 20 to 50 cm. long; spikelets acuminate, 3 to 4 mm. long.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; swamps, ditches and shallow water, at low altitudes, often forming large colonies. Tropics of both hemispheres. Type from British Guiana.

2. Hymenachne donacifolia (Raddi) Chase, Journ. Washington Acad. Sci. 13: 177. 1923.

Panicum donacifolium Raddi, Agrost. Bras. 44. 1823.

Panicum auriculatum Willd. in Spreng. Syst. Veg. 1: 322. 1825.

Hymenachne auriculata Chase, Proc. Biol. Soc. Washington 21: 5. 1908.

Similar to *H. amplexicaulis*, olivaceous throughout (at least when dry); panicles of numerous ascending, densely flowered branches, the lower distant; spikelets about 3 mm. long.

Panama; swamps and shallow water. Panama and Cuba to Brazil, whence the type, and Ecuador.

82. HOMOLEPIS Chase, Proc. Biol. Soc. Washington 24: 146. *f. 12*. 1911

Spikelets rather large, subfusiform; first and second glume equal or the first slightly longer, 7 to 9 nerved, the pair wholly covering the sterile lemma and fertile floret; sterile lemma nearly as long as the glumes, broad, infolding the fertile lemma, and inclosing a narrow hyaline palea and sometimes a staminate flower; fruit elliptic, pointed, smooth and shining, the lemma and palea less indurate than in *Panicum*, the margins of the lemma flat. Perennials with narrow panicles. Species 3, American tropics.

1. Homolepis aturensis (H. B. K.) Chase, Proc. Biol. Soc. Washington 24: 146. 1911.

Panicum aturense H. B. K. Nov. Gen. & Sp. 1: 103. *pl. 33*. 1816.

Panicum blepharophorum Presl, Rel. Haenk. 1: 312. 1830.

Creeping straggling perennial, the ascending culms 30 to 50 cm. tall, with narrowly lanceolate, flat blades 1 to 1.5 cm. wide, and narrow, pale brown panicles 5 to 10 cm. long.

Guatemala, Honduras, Nicaragua, Costa Rica, Panama; swamps, moist woods and wet places, at low altitudes. Mexico to Brazil and Bolivia. Type from Venezuela.

83. ISACHNE R. Br. Prodr. Fl. Nov. Holl. 196. 1810

Spikelets small, subglobose; glumes subequal; lower floret perfect or staminate, its lemma and palea indurate and similar in form and texture to those of the upper floret; both fruits plano-convex, nearly equal in size, usually remaining attached by the minute rachilla joint between them. Perennials or rarely annuals with flat blades and open or condensed panicles. Species about 20, tropics of both hemispheres.

Florets appressed-pubescent; blades ovate-clasping; plant low, apparently annual ..... 1. I. polygonoides.
Florets glabrous; blades narrowly lanceolate, not cordate; climbing as much as 6 meters ..... 2. I. arundinacea.

1. Isachne polygonoides (Lam.) Doell in Mart. Fl. Bras. 2 [3]: 273. 1877.

Panicum polygonoides Lam. Encycl. 4: 742. 1798.

Panicum trachyspermum Nees, Agrost. Bras. 212. 1829.

Isachne trachyspermum Nees in Seem. Bot. Voy. Herald 224. 1857.

Apparently annual; flowering shoots 20 to 30 cm. tall, erect from a long creeping, freely branching culm, rooting at the nodes, the whole plant often a meter in length, the erect shoots finally bearing fascicled branchlets; sheaths hispid; blades spreading, lanceolate-ovate, very scabrous; panicles included at base, about 5 cm. long and as broad, loosely many-flowered.

Guatemala (Chupadero, Dept. Santa Rosa), Costa Rica, Panama; wet savannas, swamps, and wet places, at low and medium altitudes. Central America to Brazil. Type from Cayenne.

2. Isachne arundinacea (Swartz) Griseb. Fl. Brit. W. Ind. 553. 1864.

Panicum arundinaceum Swartz, Prodr. Veg. Ind. Occ. 24. 1788.

Climbing among shrubs or small trees to a height of as much as 6 meters, with strong canes and elongate branches; blades commonly 20 cm. long and 1.5 to 2 cm. wide, scabrous; panicles about 12 cm. long, the long lower branches at first ascending, finally widespreading; spikelets crowded toward the ends of the branches; spikelets 1.5 mm. long, glabrous or nearly so.

Guatemala, Costa Rica, Panama; wet forest, edge of jungle, and shady slopes, 500 to 2,000 meters. Mexico and Jamaica, whence the type, to Venezuela and Bolivia.

84. OPLISMENUS Beauv. Fl. Owar. 2: 14. *pl. 68. f. 1.* 1809

Spikelets terete or somewhat laterally compressed, subsessile, solitary or in pairs, in two rows, crowded or approximate on one side of a narrow scabrous or hairy rachis; glumes about equal, emarginate or 2-lobed, awned from between the lobes; sterile lemma exceeding the glumes and fruit, mucronate or short-awned, inclosing a hyaline palea; fertile lemma elliptic acute, convex or boat-shaped, the firm margins clasping the palea, not inrolled. Freely branching, creeping, shade-loving annuals or perennials, with erect flowering shoots, flat, thin lanceolate or ovate acuminate blades, and several one-sided, thickish, short spikes rather distant on a main axis. Species about 10, in the tropics of both hemispheres.

Awns antrorsely scabrous; plants annual ..... 1. O. burmannii.
Awns smooth or obscurely roughened; plants perennial.
  Rachis of racemes mostly 2 to 3 mm. long, bearing usually not more than 5 spikelets; blades 1 to 3 cm. long, 4 to 10 mm. wide ..... 2. O. setarius.
  Rachis of lower racemes more than 1 cm. long, bearing usually more than 8 spikelets; blades mostly more than 4 cm. long, 1 to 2 cm. wide.
    Racemes closely flowered, the lower 1 to 2 cm. long ..... 3. O. hirtellus.
    Racemes loosely flowered, the lower 2 to 5 cm. long, the lower pairs of spikelets as much as 1 cm. apart ..... 4. O. rariflorus.

1. Oplismenus burmannii (Retz.) Beauv. Ess. Agrost. 54. 1812.

Panicum burmanni Retz. Obs. Bot. 3: 10. 1783.

Orthopogon burmanni Trin. Fund. Agrost. 181. 1820.

Oplismenus cristatus Presl, Rel. Haenk. 1: 323. 1830.
Oplismenus affinis Presl, Rel. Haenk. 1: 323. 1830.

Low, creeping, freely branching annual; sheaths pilose; blades broadly lanceolate-elliptic; racemes 3 to 5, pale villous, ascending, approximate along a flexuous axis; awns slender, about 1 cm. long.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; waste places, open ground, and partial shade, a common weed at low and medium altitudes. Tropics of Old World, introduced in the American tropics, Mexico, and the Dominican Republic to Brazil. Type from India.

2. Oplismenus setarius (Lam.) Roem. & Schult. Syst. Veg. 2: 481. 1817.
Panicum setarium Lam. Tabl. Encycl. 1: 170. 1791.

Slender creeping branching perennial, the ascending flowering culms 20 to 30 cm. high; blades 1 to 3 cm. long, 4 to 10 mm. wide, conspicuously undulate-margined; racemes distant, very short, the spikelets appearing to be in clusters on the rather strict axis; awns 4 to 8 mm. long.

Guatemala, Honduras; shady places, up to 1,500 meters. Southern United States, Mexico, and the West Indies to Paraguay. Type from tropical America, the exact locality not known.

3. Oplismenus hirtellus (L.) Beauv. Ess. Agrost. 54, 168. 1812.
Panicum hirtellum L. Syst. Nat. ed. 10. 2: 870. 1759.
Oplismenus chondrosioides Fourn. Mex. Pl. 2: 39. 1886.

Perennial; culms widely creeping and branching, the fertile culms usually erect from an ascending base, 20 to 70 cm. tall (usually about 30 cm.); sheaths glabrous to densely papillose-hispid; blades 5 to 10 cm. long and 1 to 2 cm. wide; panicles 5 to 10 cm. long with 3 to 7 ascending or spreading rather distant racemes 1 to 2 cm. long; awns smooth, usually purple, the longer 5 to 10 mm. long.

Guatemala, British Honduras, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; moist woods and shady banks at low and medium altitudes. Mexico and West Indies to Argentina. Type from Jamaica.

4. Oplismenus rariflorus Presl, Rel. Haenk. 1: 320. 1830.
Oplismenus liebmanni Fourn. Mex. Pl. 2: 38. 1886.
Oplismenus thiebauti Fourn. Mex. Pl. 2: 39. 1886.

Differing from *O. hirtellus* chiefly in the slender loosely flowered racemes, 2 to 5 cm. long, the spikelets sometimes as much as 1 cm. apart on the rachis.

Guatemala (Guatemala City); moist shady places, at low and medium altitudes. Mexico, whence the type, to Peru.

85. ECHINOCHLOA Beauv. Ess. Agrost. 53. *pl. 11. f. 2.* 1812

Spikelets plano-convex, often stiffly hispid, subsessile, solitary or in irregular clusters on one side of the panicle branches; first glume about half the length of the spikelet, pointed; second glume and sterile lemma equal, pointed, mucronate, or the glume short-awned and the lemma long-awned, sometimes conspicuously so, inclosing a membranaceous palea and sometimes a staminate flower; fertile lemma plano-convex, smooth and shining, acuminate, pointed, the margins inrolled below, flat above, the apex of the palea not inclosed. Coarse, often succulent, annuals or perennials with compressed sheaths, linear flat blades, and rather compact panicles composed of short, densely flowered racemes along a main axis. Species about 10, in the warm and temperate regions of both hemispheres.

Ligule a dense line of stiff yellowish hairs; plants perennial.
Awn of sterile lemma generally 5 to 10 mm. long; sterile floret staminate. **1. E. polystachya.**
Awn of sterile lemma generally 4 to 5 cm. long; sterile floret neuter. **2. E. holciformis.**
Ligule wanting, the ligular area sometimes pubescent; plants annual
Racemes simple, rather distant, 1 to 2 cm. long; spikelets crowded in about 4 rows, the awn of the sterile lemma reduced to a short point; blades 3 to 6 mm. wide ---- **4. E. colonum.**
Racemes more or less branched, usually more than 2 cm. long; spikelets irregularly crowded and fascicled, usually not arranged in rows, the awn of the sterile lemma variable; blades usually more than 5 cm. wide **3. E. crusgalli crus-pavonis.**

1. Echinochloa polystachya (H. B. K.) Hitchc. Contr. U. S. Nat. Herb. **22**: 135. 1920.

Oplismenus polystachyus H. B. K. Nov. Gen. & Sp. 1: 107. 1816.
Panicum spectabile Nees in Trin. Gram. Pan. 138. 1826.
Echinochloa spectabilis Link, Hort. Berol. 2: 209. 1833.

Perennial, usually in colonies; culms coarse, 1 to 2 meters tall, from a long creeping rooting base, glabrous; nodes densely hispid with appressed yellowish hairs; sheaths glabrous or papillose-hispid; ligule a dense line of stiff yellowish hairs as much as 4 mm. long; blades as much as 2.5 cm. wide, scabrous on the margins and upper surface; panicle 10 to 30 cm. long, rather dense; racemes ascending, the lower mostly 3 to 6 cm. long, densely hispid at base, the rachis very scabrous and more or less papillose-hispid; spikelets rather closely set, nearly sessile, about 5 mm. long; sterile floret staminate, the awn 2 to 10 mm. long; fruit rather soft, about 4 mm. long, extending into a point about 0.5 mm. long.

Panama (Ormila, near Port Obaldía); swamps and ditches near the coast, Mexico and the West Indies to Argentina.

2. Echinochloa holciformis (H. B. K.) Chase, Proc. Biol. Soc. Washington **24**: 155. 1911.

Oplismenus holciformis H. B. K. Nov. Gen. & Sp. 1: 107. 1816.
Berchtoldia holciformis Fourn. Mex. Pl. 2: 41. 1886.

Stout succulent perennial; culms erect, sometimes with a decumbent rooting base, as much as 2 meters tall and 1.5 cm. thick at base, glabrous; sheaths glabrous; ligule a dense line of stiff hairs, long on the lower leaves, short on the upper leaves; blades mostly 8 to 15 mm. wide, scabrous on the margins and upper surface; panicle dense, or interrupted below, nodding, as much as 40 cm. long; racemes appressed, the lower as much as 10 cm. long, the rachis scabrous and hispid; spikelets rather crowded, nearly sessile, about 5 mm. long, the awn as much as 5 cm. long.

Guatemala (Estanzuela, Dept. Santa Rosa; Guatemala City). Shallow water and moist places at medium altitudes. Also Mexico, whence the type.

3. Echinochloa crusgalli crus-pavonis (H. B. K.) Hitchc. Contr. U. S. Nat. Herb. **22**: 148. 1920.

Oplismenus crus-pavonis H. B. K. Nov. Gen. & Sp. 1: 108. 1816.
Panicum sabulicolum Nees, Agrost. Bras. 258. 1829.
Oplismenus angustifolius Fourn. Mex. Pl. 2: 40. 1886.
Echinochloa sabulicola Hitchc. Contr. U. S. Nat. Herb. 17: 257. 1913.

Annual; culms erect or sometimes decumbent at base, as much as 1 meter or even 1.5 meters tall, glabrous; sheaths glabrous; ligule wanting, the ligular

area sometimes slightly pubescent; blades 5 to 15 mm. wide, scabrous on the margins, sometimes on the upper surface; panicles 10 to 20 cm. long, more or less nodding; racemes mostly ascending or appressed, the lower somewhat distant, the upper approximate; spikelets crowded, excluding the awns about 3 mm. long, hispid on the nerves, hispidulous on the internerves; sterile lemma with an awn 1 to 10 mm. long.

Guatemala, Costa Rica, Panama; marshes and wet places, often in the water, at low and medium altitudes. Mexico and the West Indies to Argentina.

4. **Echinochloa colonum** (L.) Link, Hort. Berol. 2: 209. 1833.

Panicum colonum L. Syst. Nat. ed. 10. 2: 870. 1759.

Oplismenus colonus H. B. K. Nov. Gen. & Sp. 1: 108. 1816.

Annual, usually much branched at base; culms prostrate-spreading, ascending, or erect, usually 20 to 40 cm. long, glabrous; sheaths glabrous; blades rather lax, 5 to 10 cm. long, rarely longer, 3 to 6, rarely 10 mm. wide, somewhat scabrous on the margins, occasionally bearing transverse purple bands (zonate); panicles 5 to 10 or even 15 cm. long; racemes several, 1 to 2 cm. long, rarely longer, appressed or ascending, the lower usually distant as much as 1 cm.; spikelets about 3 mm. long, crowded, nearly sessile, in about 4 rows; awn reduced to a short point.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; ditches and moist places, warmer parts of both hemispheres, the type from India; introduced in America.

86. CHAETIUM Nees, Agrost. Bras. 269. 1829

Spikelets short-pediceled, dorsally compressed, lanceolate, the joint of the rachilla between the glumes elongate, the bearded base of the first glume adnate to it forming a long slender callus; glumes bearing awns three to four times the length of the body of the spikelet, the first reduced to the awn or, in *C. bromoides*, the pair broadened and inclosing the rest of the spikelet; sterile lemma bearing a shorter awn or awn-tipped only; fruit subindurate, lanceolate, the lemma acuminate into a scabrous awn or point, the thin margins flat, the summit of the palea not inclosed. Perennials with long narrow blades and dense narrow panicles. Species 3, tropical America.

1. **Chaetium bromoides** (Presl) Benth; Hemsl. Biol. Centr. Amer. Bot. 3: 503. 1885.

Berchtoldia bromoides Presl, Rel. Haenk. 1: 324. *pl. 43.* 1830.

Panicum berchtholdium Doell in Mart. Fl. Bras. 2 ^{2}: 150. 1877.

Stoloniferous perennial; culms erect or spreading, 30 to 50 cm. tall; blades flat, pilose, 4 to 6 mm. wide, mostly basal; panicles 5 to 10 cm. long.

Guatemala, El Salvador, Nicaragua, Costa Rica; grassland, 500 to 1,500 meters. Mexico, whence the type, and Central America.

87. TRICHOLAENA Schrad.; Schult. Mant. 2: 163. 1824

Spikelets on short capillary pedicels; first glume minute; second glume and sterile lemma equal, raised on a stipe above the first glume, emarginate or slightly lobed, short-awned, covered, except toward the apex, with long silky hairs, the palea of the sterile lemma well developed, fertile lemma shorter than the spikelet, cartilaginous, smooth, boat-shaped, obtuse, the margins thin, not inrolled, inclosing the margins of the palea. Perennials or annuals with rather open panicles of silky spikelets. Species about 15, in the Eastern Hemisphere, mostly in Africa, one introduced in America.

1. Tricholaena rosea Nees, "Cat. Sem. Hort. Vratisl. a. 1836"; Fl. Afr. Austr. 17. 1841. NATAL GRASS.

Tufted short-lived slender perennial, about 1 meter tall, more or less decumbent at base; sheaths sparsely papillose-hirsute; blades narrow, flat; panicles silky, rosy purple (in herbarium specimens sometimes faded to pinkish gray).

Guatemala, El Salvador; Costa Rica; open ground, thickets, and grassland, at low and medium altitudes. Africa, introduced in tropical and subtropical America, cultivated as a forage grass in Florida, now well established in several parts of Central and South America.

88. SETARIA Beauv. Ess. Agrost. 51. *pl. 13. f. 3.* 1812

(*Chaetochloa Scribn.* U. S. Dept. Agr. Div. Agrost. Bull. 4: 38. 1897)

Spikelets subtended by one to several bristles (sterile branchlets) falling free from the bristles, awnless; first glume broad, usually less than half the length of the spikelet, 3 to 5 nerved; second glume and sterile lemma equal, or the glume shorter, several-nerved; fertile lemma coriaceous-indurate, smooth or rugose. Annuals or perennials, with narrow terminal panicles, these dense and spikelike or somewhat loose and open. Species about 65, in the tropical and warm temperate regions of both hemispheres.

Blades narrowly elliptic, plaited; bristles below only a part of the spikelets, rarely below all. Subgenus PTYCHOPHYLLUM.

Plants annual; blades usually less than 2 cm. wide ..... 1. S. barbata.

Plants perennial; blades more than 3 cm. wide, sometimes as much as 10 cm. wide ..... 2. S. paniculifera.

Blades linear-lanceolate to linear; bristles below all the spikelets. SETARIA proper.

Bristles below each spikelet numerous, at least more than 5. Panicle dense, cylindric, spikelike ..... 3. S. geniculata.

Bristles below each spikelet 1, or, by the abortion of the spikelets, 2 or 3.

Bristles more or less retrorsely scabrous.

Plants perennial; spikelets globose or nearly so ..... 4. S. tenax.

Plants annual; spikelets not globose.

Spikelets about 2 mm. long ..... 5. S. verticillata.

Spikelets about 1.5 mm. long.

Panicles usually green, rarely as much as 8 cm. long, less than 5 mm. thick, the bristles 2 to 3 mm. long ..... 6. S. scandens.

Panicles usually purple, as much as 15 cm. long and 1 cm. thick, the bristles about 1 cm. long ..... 7. S. tenacissima.

Bristles antrorsely scabrous only.

Plants perennial ..... 12. S. vulpiseta.

Plants annual.

Fertile lemma coarsely transversely rugose.

Axis of panicle thickly beset with white ascending hairs. 10. S. longipila.

Axis scabrous or hispid, not beset with white hairs. 11. S. liebmanni.

Fertile lemma at maturity finely cross-lined or nearly smooth.

Plants as much at 3 meters tall. Bristles 1 to 2 cm. long; fertile lemma smooth or nearly so ..... 8. S. magna.

Plants mostly less than 1 meter tall ..... 9. S. viridis.

1. Setaria barbata (Lam.) Kunth, Rév. Gram. 1: 47. 1829.

Panicum barbatum Lam, Tabl. Encycl. 1: 171. 1791.

Panicum costatum Roxb. Fl. Ind. ed. Carey 1: 314. 1820.

Chaetochloa barbata Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 348. 1917.

Branching annual; culms decumbent, spreading, often rooting at the lower nodes, glabrous, scabrous, or villous near the pubescent nodes, as much as 2 meters long, but often much less; blades narrowly elliptic, flat and rather thin, as much as 30 cm. long and 2.5 cm. wide, distinctly plicate in large specimens, obscurely so in dwarf ones; panicles green, as much as 20 cm. long, the branches ascending or spreading, as much as 4 cm. long; spikelets oblong-elliptic, glabrous, about 2.5 mm. long, tending to be in two rows along the branches, at least along the upper part, often clustered on branchlets on the lower part of the branches, the bristles flexuous, 5 to 10 mm. long, usually rather numerous.

Panama; thickets and waste places at low altitudes. Tropical Asia (type from Mauritius), introduced in Florida, Panama, the West Indies, and Brazil.

2. Setaria paniculifera (Steud.) Fourn. Mex. Pl. 2: 42. 1886. PALMGRASS.

Panicum sulcatum Aubl. Pl. Guian. 1: 50. 1775. Not *P. sulcatum* Bertol. 1820.

Panicum paniculiferum Steud. Syn. Pl. Glum. 1: 54. 1854.

Setaria effusa Fourn. Mex. Pl. 2: 42. 1886.

Chaetochloa sulcata Hitchc. Contr. U. S. Nat. Herb. 17: 260. 1913.

Setaria sulcata A. Camus, Bull. Mus. Hist. Nat. 30: 108. 1924. Not *S. sulcata* Raddi, 1823 (based on *Panicum sulcatum* Bertol. 1820, not *P. sulcatum* Aubl. 1775).

Robust perennial; culms as much as 4 meters tall, glabrous; sheaths papillose-hispid all over or only at the margin and on the collar; blades flat, strongly plicate, somewhat scabrous, as much as 1 meter long and 10 cm. wide at the middle, tapering toward each end, the lower into a long petiole-like base; panicles green or purplish, often very large, as much as 70 cm. long, the branches ascending, finally spreading, as much as 20 cm. long, these branching and rebranching, the panicle often becoming loose and open; spikelets usually loosely arranged, elliptic-lanceolate, about 3 mm. long, obscurely nerved, scabrous-pubescent, the flexuous bristles as much as 15 mm. long.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; thickets, banks, and swamps. Mexico, whence the type, and the Lesser Antilles to Colombia.

3. Setaria geniculata (Lam.) Beauv. Ess. Agrost. 51, 178. 1812.

Panicum geniculatum Lam. Encycl. 4: 727 (err. typ. 737). 1798.

Setaria gracilis H. B. K. Nov. Gen. & Sp. 1: 109. 1816.

Setaria purpurascens H. B. K. Nov. Gen. & Sp. 1: 110. 1816.

Panicum imberbe Poir. in Lam. Encycl. Suppl. 4: 272. 1816.

Setaria imberbis Roem. & Schult. Syst. Veg. 2: 891. 1817.

Panicum flavum Nees, Agrost. Bras. 238. 1829.

Setaria flava Kunth, Rév. Gram. 1: 46. 1829.

Setaria penicillata Presl, Rel. Haenk. 1: 314. 1830.

Chaetochloa imberbis Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 39. 1897.

Chaetochloa penicillata Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 39. 1897.

Chaetochloa flava Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 39. 1897.

Chaetochloa purpurascens Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 13. 1900.

Chaetochloa gracilis Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 15. 1900.

Chaetochloa geniculata Millsp. & Chase, Field Mus. Bot. 3: 37. 1903.

Perennial, producing short knotty branching rhizomes as much as 4 cm. long; culms erect to nearly prostrate, as much as 1 meter tall, sometimes dwarfed, the base usually hard and wiry, often more slender than the upper part; blades flat, scabrous, often more or less villous toward the base on the upper surface, commonly 10 to 20 cm. long and 4 to 8 mm. wide; panicle, erect, cylindric, densely flowered, rounded or truncate (not narrowed), at summit, 1 to 10 cm. long or in robust specimens longer, 4 to 8 mm. thick (excluding the bristles), yellow, purple, tawny, or greenish; bristles mostly 8 to 12, yellow or purple, one to three times as long as the spikelets, sometimes longer; spikelets 2 to 2.5 or even 3 mm. long, ovoid, plano-convex; fertile lemma transversely rugose with close narrow ridges.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; open ground, pastures, cultivated soil and moist ground, United States, Mexico, and the West Indies to Argentina, at low and medium altitudes. Type from Guadeloupe. This species is exceedingly variable in general appearance, due to the color and length of the bristles, which are long early in the season and in cultivated soil, and short in plants of dry situations.

4. Setaria tenax (L. Rich.) Desv. Opusc. 78. 1831.

Panicum tenax L. Rich. Act. Soc. Hist. Nat. Paris 1: 106. 1792.

Panicum impressum Nees, Agrost. Bras. 247. 1829.

Panicum sphaerocarpum Salzm.; Steud. Syn. Pl. Glum. 1: 51. 1854.

Chaetochloa impressa Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 350. 1917.

Setaria sphaerocarpa Hubb. Contr. Gray Herb. n. ser. 52: 60. 1917.

Chaetochloa tenax Hitchc. Contr. U. S. Nat. Herb. 22: 176. 1920.

Perennial; culms scabrous below the panicle, 1 to 1.5 meters tall, often geniculate at base; sheaths villous on the margin, densely hispid on the collar; ligule densely pilose, 2 to 3 mm. long; blades flat, as much as 35 cm. long and 2 cm. wide, narrowed at base, acuminate; panicles rather densely flowered, narrowed toward summit but not attenuate, 15 to 30 cm. long, 2 to 3 cm. wide, the branches ascending, the lower about 2 cm. long; bristles 1 or 2 below each spikelet, 1 to 2 cm. long, flexuous, retrorsely scabrous and often also antrorsely toward the base, sometimes barblets directed both ways intermixed, pale or tawny, becoming implicate and somewhat one sided with age; spikelets subspheric, about 2 mm. long, very turgid on one side and somewhat convex on the other; fertile lemma rather indistinctly cross wrinkled.

Panama; brushy slopes and grassy hills, at low altitudes. Mexico and the West Indies to Brazil. Type from Cayenne.

5. Setaria verticillata (L.) Beauv. Ess. Agrost. 51, 178. 1812.

Panicum verticillatum L. Sp. Pl. ed. 2. 1: 82. 1762.

Chaetochloa verticillata Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 39. 1897.

Annual, often much branched at base and geniculate-spreading; blades flat, rather thin, usually 10 to 20 cm. long and 5 to 10 mm. wide; scabrous on both surfaces, often more or less pilose; panicles erect but not stiff, subcylindric, more or less lobate or interrupted, especially toward base, mostly 5 to 15 cm. long, 7 to 15 mm. wide; bristles one to three times as long as the spikelets, somewhat flexuous, retrorsely scabrous to base; spikelets about 2 mm. long, oblong-elliptic, not very turgid on the convex side; fertile lemma finely cross wrinkled.

Guatemala (Antigua); a weed in cultivated soil and waste places. A native of the Old World now introduced in the United States and other temperate countries of America.

6. Setaria scandens Schrad.; Schult. Mant. 2: 279. 1824.

Panicum scandens Trin. Gram. Pan. 166. 1826.

Chaetochloa scandens Scribn. in Donn. Smith, Enum. Pl. Guat. 5: 91. 1899.

Slender, annual, much branched below, erect or soon geniculate-spreading; culms sometimes rooting at the lower nodes, as much as 80 cm. long; blades flat, linear-lanceolate, as much as 10 cm. long and 1 cm. wide, scabrous, especially on upper surface, usually sparsely, sometimes densely pilose on both surfaces; panicles slender, erect, cylindric, densely flowered, sometimes interrupted, especially at base, often purplish, as much as 8 cm. long, mostly less than 5 mm. thick, the axis softly pubescent and also long-villous, the scattered hairs often longer than the spikelets; bristles somewhat flexuous but not becoming implicate, one to two times as long as the spikelets, antrorsely scabrous except near the tip, there more or less retrorsely scabrous; spikelets about 1.5 mm. long, ovoid, turgid on the convex side; fertile lemma transversely striate or weakly rugose.

Guatemala, Costa Rica, Panama; open ground, often a weed in cultivated soil, at low and medium altitudes. Central America and the West Indies to Paraguay. Originally described from a garden specimen, the origin not known.

7. Setaria tenacissima Schrad.; Schult. Mant. 2: 279. 1824.

Panicum tenacissimum Nees, Agrost. Bras. 238. 1829.

Chaetochloa tenacissima Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 352. 1917.

Slender annual, mostly simple or little branched; culms erect, 1 to 2 meters tall, leaning on or clambering over other vegetation; blades flat, very scabrous on both surfaces and more or less pubescent, especially beneath, mostly 10 to 15 cm., sometimes as much as 20 cm. long, mostly not more than 8 mm. wide, tapering to a long-acuminate apex, rather abruptly narrowed at base; panicles somewhat nodding or flexuous, rather densely flowered and tapering toward the summit, somewhat interrupted toward the base, as much as 15 cm. long and 1 cm. thick (excluding bristles), the axis densely pubescent and sparsely villous with long weak hairs; bristles flexuous, becoming implicate, about 1 cm. long, scabrous, antrorsely below, retrorsely above; spikelets about 1.5 mm. long, often dark purple; fertile lemma transversely rugose with numerous fine ridges.

Guatemala, Honduras, El Salvador, Costa Rica, Panama; brushy hillsides, at low and medium altitudes. Central America and the West Indies to Brazil, whence the type.

8. Setaria magna Griseb. Fl. Brit. W. Ind. 554. 1864.

Chaetochloa magna Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 39. 1897.

Robust, erect, annual, usually not branched at base, sparingly branched above, the branches erect; culms as much as 4 meters tall, rarely taller, and 2 cm. thick at base; blades flat, scabrous, as much as 50 cm. long and 3.5 cm. wide; panicles densely flowered, nodding, often interrupted at base, tapering at each end, as much as 40 cm. long and 3 cm. thick, those of the branches much smaller; bristles somewhat flexuous, 1 or 2 below each spikelet, 1 to 2 cm. long; spikelets about 2 mm. long; fertile lemma smooth.

Costa Rica (Boca Zacate, Pacific coast); marshes and wet places along the coast. Eastern United States, Costa Rica, and the West Indies. Type from Jamaica.

9. Setaria viridis (L.) Beauv. Ess. Agrost. 51, 178. 1812.

Panicum viride L. Syst. Nat. ed. 10. 2: 870. 1759.

Chaetochloa viridis Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 39. 1897.

Annual, usually branched at base, sometimes geniculate-spreading; culms usually 20 to 40 cm., sometimes 100 cm. tall; blades flat, scabrous especially on the upper surface, usually less than 15 cm. long, commonly less than 1 cm. wide, sometimes as much as 15 mm. wide; panicle erect or somewhat nodding, densely flowered, green or purple, cylindric but tapering a little at the summit (the smaller ones ovate), 5 to 10 cm. long, commonly 5 to 8 mm. thick (excluding bristles); bristles 1 to 3 below each spikelet, mostly three to four times as long as the spikelet, antrorsely scabrous, greenish or rarely purplish; spikelets 2 to 2.5 mm. long, elliptic, not much turgid on the convex side; fertile lemma finely transversely wrinkled or ridged.

Costa Rica (Cartago, 1,700 meters); a native of Europe, widely established in the United States as a weed in cultivated soil, rare in the Tropics. Also in Mexico and Bermuda.

10. Setaria longipila Fourn. Mex. Pl. 2: 47. 1886.

Chaetochloa longipila Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 22. 1900.

Erect annual; culms 30 to 40 cm. tall; nodes hispidulous; blades flat, 7 to 10 cm. long, as much as 1 cm. wide; panicle spikelike, cylindric, somewhat interrupted, 4 to 7 cm. long, about 5 mm. wide, the axis thickly beset with white ascending hairs about 2 mm. long; bristles mostly one below each spikelet, 3 to 5 mm. long; spikelets 1.7 mm. long; fertile lemma sharply transversely rugose.

Guatemala (Mazatenango), El Salvador (Finca San Nicolás); woods. Also Mexico, whence the type.

11. Setaria liebmanni Fourn. Mex. Pl. 2: 44. 1886.

Chaetochloa liebmanni Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 31. 1900.

Annual, often branched at base; culms 30 to 100 cm. tall; blades flat, rather thin, as much as 20 cm. long and 2 cm. wide, usually about 1 cm. wide, narrowed toward both ends, scabrous, especially beneath; panicles loosely flowered, cylindric, tapering at each end, often nodding or flexuous, as much as 30 cm. long, usually 10 to 20 cm.; bristles slender, flexuous, antrorsely scabrous, 7 to 15 mm. long; spikelets ovate, about 2 mm. long, rather turgid on the convex side, rather prominently nerved; fertile lemma somewhat pointed, gibbous, coarsely and strongly transversely rugose.

Nicaragua (San Juan del Sur; Masaya); rocky cliffs. Arizona to Nicaragua. Type from Mexico.

12. Setaria vulpiseta (Lam.) Roem. & Schult. Syst. Veg. 2: 495. 1817.

Panicum vulpisetum Lam. Encycl. 4: 735 (err. typ. 745). 1798.

Setaria composita H. B. K. Nov. Gen. & Sp. 1: 111. 1816.

Chaetochloa composita Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 39. 1897.

Chaetochloa vulpiseta Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 350. 1917.

Perennial, branching at base, often in large tufts; culms stout, often decumbent at base, as much as 2 meters tall; blades flat, gradually narrowed from the middle toward both ends, the larger somewhat plaited, scabrous, especially beneath, as much as 50 cm. long and 3 cm. wide; panicles rather densely and evenly flowered, tapering toward the apex and often somewhat tapering at base, as much as 30 cm. long and 4 or 5 cm. wide (secondary panicles much smaller, sometimes only 5 cm. long), the branches stiffly ascending or spreading, as much as 2 or 3 cm. long and of about equal length except toward the summit, the axis densely villous; bristles 1 or 2 at the base of each spikelet,

slightly flexuous, brownish, antrorsely scabrous, mostly 1 to 2 cm. long, appearing secund on the branches after the fall of the spikelets; spikelets ovoid, 2 to 2.5 mm. long, pale; fertile lemma strongly and rather coarsely cross-wrinkled.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; open ground and brushy slopes at low and medium altitudes. Southern Mexico and the West Indies, Peru and Argentina. Type from Dominican Republic.

89. IXOPHORUS Schlecht. Linnaea 31: 420. 1862

Spikelets as in *Panicum*, lanceolate, glabrous, short-pediceled, the pedicel bearing a flexuous bristle just below the spikelet; first glume about one-fourth as long as the spikelet, rounded, 3-nerved; second glume and sterile lemma equal, pointed, the latter inclosing a palea and staminate flower, the palea at maturity cartilaginous and winged, much wider than the spikelet; fertile floret shorter than the sterile lemma, indurate, minutely roughened. A succulent annual with flat blades and narrow panicles of numerous ascending 1-sided racemes along a main axis. Species one.

1. **Ixophorus unisetus** (Presl) Schlecht. Linnaea 31: 420, 747. 1862.
   Urochloa uniseta Presl, Rel. Haenk. 1: 319. 1830.
   Panicum unisetum Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 1: 217. 1834.
   Setaria uniseta Fourn.; Hemsl. Biol. Centr. Amer. Bot. 3: 506. 1885.
   Setaria cirrhosa Fourn. Mex. Pl. 2: 43. 1886.

   Erect or spreading, 50 to 150 cm. tall; blades 15 to 30 cm. or even as much as 60 cm. long, as much as 4 cm. wide; panicles 10 to 20 cm. long, the racemes approximate, 3 to 6 cm. long; spikelets about 4 mm. long, the bristles 3 to 10 mm. long.

   Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica; low thickets, ditches and wet places, at low altitudes. Mexico, whence the type, to Colombia.

90. PENNISETUM L. Rich. in Pers. Syn. Pl. 1: 72. 1805

Spikelets solitary or in groups of two or three, surrounded by an involucre of bristles, these not united except at the very base, often plumose, falling attached to the spikelets; first glume shorter than the spikelet, sometimes minute or wanting; second glume shorter than or equaling the sterile lemma; fertile lemma chartaceous, smooth, the margin thin, inclosing the palea. Annuals or perennials, with usually flat blades and dense spikelike panicles. Species about 50, in the tropical regions of both hemispheres.

Fascicles, or most of them, with 2 or more spikelets.

Culms 2 to 4 meters tall, robust; panicles mostly more than 15 cm. long, very dense, the axis terete, densely pubescent ..... 2. P. purpureum.

Culms mostly less than 1 meter tall, slender; panicles mostly less than 15 cm. long, somewhat interrupted, the axis angled, scabrous or puberulous.

Inner bristles conspicuously plumose ..... 1. P. ciliare.

Inner bristles sparsely plumose ..... 3. P. vulcanicum.

Fascicles with but one spikelet.

Bristles conspicuously plumose ..... 4. P. setosum.

Bristles not plumose.

Panicles terminal on the primary culm and leafy branches only ..... 5. P. complanatum.

Panicles terminal and axillary, the latter on slender naked peduncles, 1 to several from a sheath.

Sterile lemma empty; panicles rather densely flowered; most of the bristles not more than once and a half the length of the spikelets
6. P. distachyum.

Sterile lemma inclosing a well-developed palea and usually a staminate flower; panicles loosely flowered; most of the bristles about twice the length of the spikelet
7. P. bambusiforme.

1. **Pennisetum ciliare** (L.) Link, Hort. Berol. 1: 213. 1827.
Cenchrus ciliaris L. Mant. Pl. 302. 1771.
Pennisetum cenchroides L. Rich. in Pers. Syn. Pl. 1: 72. 1805.

Perennial, tufted from a knotted crown; culms geniculate, 10 to 50 cm. tall, sometimes taller, sparingly branching; blades flat or folded, 2 to 10 cm. long (longer in plants in moist situations), 3 to 5 mm. wide, scabrous on the upper surface and long-pilose toward the base, glabrous or nearly so beneath; panicle 1.5 to 10 cm. long, not dense, purplish, mostly flexuous, the axis slender, angled, scabrous; fascicles spreading; bristles united at the very base, flexuous, unequal, the outer short, slender, scabrous only, the inner thicker, about twice the length of the spikelet, ciliate, the innermost one a little longer than the rest; spikelets 1 to 5 in a fascicle, sessile, 4 to 5.5 mm. long, about 1.5 mm. wide, scaberulous.

Guatemala (Zacapa); El Salvador (Rosario); arid open ground, Eastern Hemisphere, introduced in Central America and Porto Rico.

2. **Pennisetum purpureum** Schumach. Beskr. Guin. Pl. 64. 1827.

NAPIER GRASS.

This African grass has been tested for forage in several parts of the American tropics under the name of elephant grass and Napier grass. We have specimens from Guatemala, El Salvador, and Costa Rica. It is a robust leafy tufted branching perennial 2 to 4 meters tall, with elongate blades 2 to 3 cm. wide, and dense, stiff, tawny or purplish panicles, the fascicles sessile, the sparsely plumose bristles exceeding the two or three unequally pediceled spikelets.

3. **Pennisetum vulcanicum** Chase, Journ. Washington Acad. Sci. 13: 363. 1923.

Erect perennial, about 1 meter tall; blades flat 20 to 45 cm. long and 5 to 8 mm. wide, tapering into a long setaceous point, more or less papillose-pubescent on the upper surface; panicle 10 to 17 cm. long, 18 to 20 mm. wide excluding the longest bristles, tawny or obscurely purple-tinged, rather dense except at the base; fascicles on hairy peduncles 1 to 1.5 mm. long, finally spreading or reflexed; bristles numerous, scabrous, united at the very base, very unequal, the outermost short, slender, scabrous only, the inner 1 to 1.5 cm. long, flattened, flexuous, plumose about half their length, the innermost one stouter, 2 to 5 cm. long, plumose at base, unequal in fascicles of the same panicle, the longer in the middle fascicles; spikelets 3 to 5 in each fascicle (only 1 or 2 well developed), sessile, 6 to 9 mm. long, attenuate, scaberulous.

El Salvador (Chalchuapa, the type); Costa Rica (Nuestro Amo); known only from rocky open slopes in the uplands of Central America.

4. **Pennisetum setosum** (Swartz) L. Rich. in Pers. Syn. Pl. 1: 72. 1805.
Cenchrus setosus Swartz, Prodr. Veg. Ind. Occ. 26. 1788.
Pennisetum purpurascens H. B. K. Nov. Gen. & Sp. 1: 113. 1816.
Pennisetum nicaraguense Fourn. Bull. Soc. Bot. France II. 27: 293. 1880.

Perennial, in loose clumps, sometimes of 30 or more culms; culms usually 1 to 2 meters tall, slender to robust, subcompressed, ascending or suberect from the more or less geniculate, sometimes rooting lower nodes, bearing one to several

flowering branches from the lower and middle nodes, scabrous below the panicle, otherwise glabrous; blades mostly rather firm, 10 to 40 cm. long, 4 to 18 mm. wide, panicles terminating the primary clum and branches, occasionally one or two axillary panicles borne in the upper sheaths, 10 to 25 cm. long, 8 to 10 mm. thick, excluding the elongate bristles, rather dense, usually somewhat nodding, from pale yellow to dusky purple or brown; fascicles sessile, at first ascending, spreading or reflexed in age; bristles unequal, the outer delicate, most of them shorter than the spikelet, the inner densely silky-plumose below, the hairs directed inward, those of the erect lower part of adjoining bristles matted and beautifully crimped; spikelets solitary, sessile, 3.2 to 4 mm. long.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; open slopes and savannas, at low and medium altitudes. Southern Florida, Mexico, and the West Indies, to Brazil and Bolivia. Type from the West Indies, the exact locality not known.

5. Pennisetum complanatum (Nees) Hemsl. Biol. Centr. Amer. Bot. 3: 507. 1885.

Gymnothrix complanata Nees, Bonplandia 3: 83. 1855.
Gymnothrix mexicana Fourn. Mex. Pl. 2: 48. 1886.
Gymnothrix grisebachiana Fourn. Mex. Pl. 2: 48. 1886.
Pennisetum mexicanum Hemsl.; Jacks. Ind. Kew. 2: 458. 1894.

Perennial; culms solitary or few together, erect or ascending from a strong rhizome, 1 to 2 meters tall, sometimes dwarfed, simple or, more commonly, with one or two, rarely with several, flowering branches; blades flat, or folded at base, 20 to 55 cm. long, 5 to 8 or rarely 10 mm. wide, very scabrous on the upper surface, often papillose-pilose toward the base and with stiff hairs just back of the ligule, setaceous-attenuate; panicles nodding or somewhat flexuous, 7 to 16 cm. long, about 10 to 12 mm. thick, excluding the longest bristles; fascicles on very minute bearded peduncles; bristles numerous, unequal, most of them exceeding the spikelet, 12 to 15 mm. long, the innermost 15 to 25 mm. long; spikelet solitary, sessile, 6 to 7 mm. long.

Guatemala, El Salvador, Nicaragua, Panama; open rather dry slopes and savannas up to 1,500 meters altitude. Mexico and Central America. Type from Panama.

6. Pennisetum distachyum (Fourn.) Rupr. Bull. Acad. Sci. Brux. 9[2]: 242. 1842, nom. nud.; Chase, Contr. U. S. Nat. Herb. 22: 229. 1921.[2]

Gymnothrix distachya Fourn. Mex. Pl. 2: 48. 1886.

Robust perennial; culms 1 to 4 meters tall, mostly solitary, erect or ascending from a decumbent base, often rooting at the geniculate lower nodes, branching from the middle and upper nodes, the primary branches ascending, the secondary and ultimate branchlets spreading or nodding, with 1 to 4 slender-peduncled drooping panicles from each sheath, the whole forming a top-heavy leafy compound inflorescence; nodes appressed-hirsute; blades flat, appressed-hirsute on both surfaces or glabrate beneath and sometimes nearly so above, those of the main culm 25 to 45 cm. long, 1.5 to 3.5 cm. wide, narrowed or attenuate at base, the attenuation sometimes elongate, the apex acuminate, not setaceous-tipped, those of the branches smaller, lanceolate, rounded or slightly narrowed at base; panicles numerous, dull green, terminal and axillary, the slender flexuous peduncles unequal, the longest often 10 to 20 cm. long, the shortest included; panicles rather densely flowered, 3 to 8 cm., rarely 10 cm.,

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[2] This name was given as a synonym of *Gymnothrix distachya* by Fournier, Mex. Pl. 2: 48. 1886.

long, about 1 cm. wide, excluding the longest bristles, usually tapering to the apex, the longer ones flexuous; fascicles on minute pubescent peduncles; bristles slender, scant (mostly less than 20), unequal, most of them shorter than the spikelet or but little exceeding it, the innermost about twice as long as the spikelet; spikelets 4.5 to 5.5 mm. long.

Guatemala, Costa Rica, ravines along stream borders, and in moist ground, at medium altitudes (1,000 to 1,500 meters). Mexico, the type from State of Vera Cruz, and Central America.

7. **Pennisetum bambusiforme** (Fourn.) Hemsl.; Jacks. Ind. Kew. **2**: 458. 1894.
Gymnothrix bambusiformis Fourn. Mex. Pl. 2: 48. 1886.

Robust perennial, culms as much as 6 meters tall, branching from the upper nodes, the branches often in fascicles of 2 or 3, slender, repeatedly branching, the whole forming a drooping compound leafy inflorescence; blades flat, rather firm, those of the main culm 20 to 35 cm. long, 2 to 3.5 cm. wide, narrowed, sometimes somewhat attenuate at base, scabrous or appressed-pubescent on the upper surface, softly appressed-pubescent beneath, sometimes glabrescent, the blades of the ultimate branchlets narrow, much reduced; peduncles slender, flexuous, unequal, one panicle of the fascicle partly included; panicles purplish tawny, 5 to 12 cm. long (rarely longer), about 1 cm. wide, excluding the longest bristles, loose, flexuous, tapering at the apex; fascicles on minute pedicels, not crowded, ascending; bristles slender, flexuous, numerous, very unequal, most of them about twice the length of the spikelet, the innermost sometimes as much as 2 cm. long; spikelets 5 to 6 mm. long.

Guatemala, El Salvador, Costa Rica; rocky slopes and cliffs 1,000 to 3,000 meters altitude. Mexico, the type from Mirador, to Peru.

91. CENCHRUS L. Sp. Pl. 1049. 1753. SANDBUR

Spikelets solitary or few together, surrounded and inclosed by a spiny bur composed of numerous coalescing bristles (sterile branchlets), the bur globular, the peduncle short and thick, articulate at base, falling with the spikelets and permanently inclosing them. Ours branching annuals with flat blades and racemes of burs, the burs readily deciduous. Species about 25, in the warmer parts of both hemispheres, but chiefly in America.

Involucre (bur), with flattened spreading spines, no ring of slender bristles at base ..... 4. C. pauciflorus.
Involucre with a ring of slender bristles at base.
  Bristles antrorsely scabrous, much exceeding the involucral lobes. ..... 1. C. pilosus.
  Bristles retrorsely barbed, not much exceeding the involucral lobes.
    Burs, excluding the bristles, not more than 4 mm. wide, numerous, crowded in a long spike; lobes of the involucre interlocking, not spinelike. ..... 2. C. viridis.
    Burs, excluding the bristles, 5 to 7 mm. wide, not densely crowded; lobes of the involucre erect or nearly so or rarely one or two lobes interlocking, the tips spinelike ..... 3. C. echinatus.

1. **Cenchrus pilosus** H. B. K. Nov. Gen. & Sp. 1: 116. *pl. 36*. 1816.
Cenchrus pallidus Fourn. Mex. Pl. 2: 50. 1886.

Culms often rather stout, usually decumbent at base and rooting at the lower nodes, 20 to 100 cm. long; blades 10 to 40 cm. long, or rarely longer, 6 to 12 mm. wide; spikes finally rather long-exserted, 5 to 14 cm. long, dense or loose at the base; burs globose, the body about 5 mm. high, as broad or broader, densely villous, tawny, the numerous slender bristles antrorsely scabrous, commonly pur-

plish, the inner more than twice as long as the body, the lobes of the body about 8, interlocking at maturity; spikelets usually 3.

El Salvador, Nicaragua; moist open ground up to about 1,000 meters altitude. Mexico to Colombia and Venezuela (whence the type).

2. Cenchrus viridis Spreng. Syst. Veg. 1: 301. 1825.

Cenchrus echinatus viridis Spreng.; Griseb. Fl. Brit. W. Ind. 556. 1864.

Culms often rather robust, 30 to 100 cm. tall or more, erect from a more or less geniculate base, sparingly branching from the base or lower nodes; blades thin, flat, lax, mostly 10 to 30 cm. long, 6 to 12 mm. wide; spike usually short-exserted, 4 to 10 cm. long, rarely longer, dense; burs depressed-globose, the body about 4 mm. high, as broad or broader, villous, tawny, the outer bristles numerous, very slender, crowded toward the base, the inner usually exceeding the body and the spikelets, erect or spreading, the lobes of the body usually 6 to 8, interlocking at maturity; spikelets usually 3.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; open ground and waste places, often a weed in cultivated fields, at low altitudes. Southern Florida, Mexico, and the West Indies to Brazil. Type from Guadeloupe.

3. Cenchrus echinatus L. Sp. Pl. 1050. 1753.

Cenchrus brevisetus Fourn. Mex. Pl. 2: 50. 1886.

Culms ascending from a geniculate or decumbent base, often rooting at the lower nodes, branching from the base and usually from the lower nodes, commonly 25 to 60 cm. long, sometimes as much as 1 meter long; blades commonly 6 to 20 cm. long and 3 to 8 mm. wide; spikes finally rather long-exserted, 3 to 10 cm. long (commonly not more than 7 cm. long), not very dense; burs truncate at base, the body 4 to 7 mm. high, as broad or broader, pubescent, tawny or plumbeous, the outer slender, the inner stout, broadened at base, the longest of them usually about equaling the lobes of the body, ascending or spreading, the lobes of the body commonly 10, erect or bent inward, the tips hard and spinelike, retrorsely barbed; spikelets about 4.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; open ground and waste places, a common weed at low and medium altitudes. Throughout the American Tropics. Type from Jamaica.

4. Cenchrus pauciflorus Benth. Bot. Voy. Sulph. 56. 1840.

This species has often been referred to *C. tribuloides* L. and to *C. carolinianus* Walt.

Sometimes forming large mats; culms 20 to 90 cm. long, rather stout, spreading to ascending from a decumbent base, usually freely branching; blades from flat to subinvolute or folded, 3 to 15 cm. long, 2 to 7 mm. wide; spikes numerous, short-exserted or partly included, 3 to 10 cm. long; burs rather crowded (excluding the spines), 3 to 7 mm. wide (commonly 4 to 6 mm.), pubescent, often densely so, rarely nearly glabrous; spines numerous, spreading or reflexed, flat, broadened at base, the lowermost shorter and relatively slender, some of the upper ones commonly 4 to 5 mm. long, usually villous at the base; body of the bur often with one deep cleft on the outer face, the lobes commonly about eight, usually villous at the base, rigid and spinelike; spikelets usually 2.

Honduras, El Salvador, Nicaragua, Costa Rica, Panama; sandy open ground, seashore on the Pacific side. United States, Mexico, and the West Indies to Argentina. Type from Lower California.

A specimen from Boca Banana, Costa Rica (Atlantic side) appears to be CENCHRUS TRIBULOIDES L., but the burs are smooth. *C. tribuloides* is more

robust than *C. pauciflorus* and has decumbent culms and large woolly burs. It is found on the sands of the seacoast from New York to Louisiana, West Indies, and Brazil. The type from Virginia.

92. OLYRA L. Syst. Nat. ed. 10. 2: 1261. 1759

Plants monoecious; inflorescence paniculate; pistillate spikelets borne on the upper branches and on the ends of the lower branches of loose terminal panicles, the smaller staminate spikelets pedicellate along the lower branches; pistillate spikelets rather large; first glume wanting; second glume and sterile lemma herbaceous, caudate-acuminate; fruit bony-indurate; staminate spikelets readily deciduous; glumes and sterile lemma wanting, the lemma and palea membranaceous. Erect or clambering perennials with broad blades. Species about 25, tropical America, one also in Africa.

Fruit pitted----5. O. standleyi.
Fruit not pitted.
  Fruit silky-pubescent at base and margins----4. O. yucatana.
  Fruit smooth and glabrous.
    Panicles ovoid, few-flowered, less than 3 cm. long; pistillate spikelets less than 3 mm. long----1. O. lateralis.
    Panicles at least the primary, much more than 10 cm. long, many-flowered; pistillate spikelets more than 3 mm. long.
      Fruit about 5 to 6 mm. long----2. O. latifolia.
      Fruit about 10 mm. long----3. O. caudata.

1. **Olyra lateralis** (Presl) Chase, Proc. Biol. Soc. Washington 21: 179. 1908.
   Panicum laterale Presl, Rel. Haenk. 1: 305. 1830.

Branching straggling perennial, more delicate than the other species; blades oblong, lanceolate, mostly 3 to 4 cm. long, 5 to 10 mm. wide, glaucous beneath; panicles delicate, about 2 cm. long and about as wide; staminate spikelets linear, 3 to 4 mm. long; pistillate spikelets ovoid, 2 to 3 mm. long, at the periphery of the panicle.

Costa Rica (700 to 1,100 meters); copses and shady banks, Central America to Bolivia, at medium altitudes. Type from Peru.

2. **Olyra latifolia** L. Syst. Nat. ed. 10. 2: 1261. 1759.
   Olyra arundinacea H. B. K. Nov. Gen. & Sp. 1: 197. 1816.

Glabrous perennial, bamboolike in aspect, commonly 5 meters tall, with flat, firm, asymmetrically lanceolate-oblong, abruptly acuminate blades commonly 20 cm. long and 5 cm. wide, and ovoid panicles 10 to 15 cm. long, the branches stiffly ascending or spreading, each bearing a single large long-acuminate pistillate spikelet at the thickened summit and several small slender-pediceled staminate spikelets along the branches; fruit 5 to 6 mm. long, smooth and shiny like porcelain, white varying to gray or dark drab.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; copses and shady banks, at low and medium altitudes. Mexico and the West Indies to Brazil and Bolivia. Type from Jamaica.

3. **Olyra caudata** Trin. Linnaea 10: 292. 1836.
   Olyra pittieri Hack. Oesterr. Bot. Zeitschr. 51: 461. 1901.

Differing from *O. latifolia* in the corymbiform panicle with several fastigiate branches about 10 cm. long, the longer glumes (including the long point about 5 cm. long), and the much larger fruit (9 to 10 mm. long).

Costa Rica; woods, Cordoncillal, 300 to 500 meters. British Guiana to Brazil and Peru. In North America known only from a single collection, the type of *O. pittieri*.

4. Olyra yucatana Chase, Proc. Biol Soc. Washington 21: 178. 1908.

Resembling *O. latifolia;* blades unequally trapezoid-truncate at base; panicles smaller and narrower than in *O. latifolia;* fruit 7 mm. long, white and shining, silky pubescent at base and margins.

Guatemala (Uapactum, Tikal district, Petén, altitude 100 to 500 meters); British Honduras. Also in southern Mexico, type from Chichankanab.

5. Olyra standleyi Hitchc. Proc. Biol. Soc. Washington 40: 86. 1927.

Erect cespitose perennial; culms slender, 1 to 3 meters tall, the nodes in dry specimens presenting one or two raised dark sharp edges, sometimes hirsutulous on these ridges; ligule shorter than the somewhat flaring border at the top of the sheath; blades oblong-elliptic, as much as 17 cm. long and 4 cm. wide (the lower not seen), somewhat cordate at base, puberulent on the upper surface at base and on the short petiole; panicle of several fastigiate branches spreading at maturity, the axis extending above the whorl and bearing one or two ascending branches, the main branches 8 to 12 cm. long, bearing appressed spikelets, 1 to 4 pistillate spikelets on the upper part, staminate spikelets below, the peduncle and base of the branches more or less puberulent, smaller axillary panicles from the upper sheaths; staminate spikelets about 1 cm. long, the lemma narrow, acuminate-pointed, the palea a little shorter, acute; pistillate spikelets glabrous, the glume and sterile lemma 5-nerved, rather thin, somewhat reticulate with cross veins, gradually accuminate, pointed, the glume (including the point) about 2 cm. long, the sterile lemma a little shorter; fruit narrow, about 8 mm. long, narrowed to an obtuse apex, glabrous, minutely pitted, the pits oblong; palea nearly as long as the lemma, almost inclosed by the margins of the lemma.

Costa Rica (El Muñeco on the Río Navarro, Province of Cartago, moist woods, 1,400 to 1,500 meters altitude, the type).

93. LITHACHNE Beauv. Ess. Agrost. 135. *pl. 24 f. 2.* 1812

Plants monoecious; spikelets in small axillary panicles, these with a single spikelet at the summit and 1 to several staminate spikelets below; terminal panicle if present wholly staminate; first glume of pistillate spikelet wanting; second glume and sterile lemma herbaceous, long-acuminate; fruit bony-indurate, laterally subcompressed, the lemma greatly swollen or gibbous on the back, the narrow palea slightly convex; staminate spikelets reduced to the lemma and palea. Slender perennials with wiry culms and flat blades. Species 2, tropical America.

1. Lithachne pauciflora (Swartz) Beauv.; Poir. Dict. Sci. Nat. 27: 60. 1823.

Olyra pauciflora Swartz, Prodr. Veg. Ind. Occ. 21. 1788.

Olyra axillaris Lam. Encycl. 4: 547. 1797.

Lithachne axillaris Beauv. Ess. Agrost. 166. *pl. 24. f. 2.* 1812.

Tufted perennial; culms slender, hard, geniculate and naked below, ascending and leafy above, commonly 30 to 50 cm. tall; blades flat, usually 5 to 8 cm. long, asymmetric, rhombic-lanceolate, acuminate, spreading, crowded toward the summit, the small axillary panicles produced from the upper sheaths; fruit 4 to 5 mm. long, white.

Guatemala, Honduras, Costa Rica, Panama; moist woods up to about 2,000 meters. Mexico and the West Indies to Argentina. Type from Jamaica.

94. RADDIA Bertol. Opusc. Sci. Bologna 3: 410. 1819

Plants monoecious; staminate and pistillate spikelets in distinct small panicles, the staminate terminal or from the upper nodes, the pistillate axillary; first glume of the pistillate spikelets wanting, the second glume and sterile

lemma membranaceous, acuminate; fruit dorsally subcompressed, narrow, bony-indurate. Slender perennials with flat blades and narrow panicles. Species about 6, tropical America.

Sheaths densely hirsute----------3. R. costaricensis.
Sheaths glabrous or nearly so.
  Blades 4 to 7 cm. long----------2. R. strictiflora.
  Blades 1.5 to 3 cm. long----------1. R. concinna.

1. **Raddia concinna** (Hook. f.) Chase, Proc. Biol. Soc. Washington 21: 185. 1908.

Olyra concinna Hook. f; Curtis's Bot. Mag. III. 52: *pl. 7469*. 1896.

Erect cespitose perennial, 15 to 30 cm. tall, the conspicuously distichous leafy shoots resembling the pinnately compound leaves of a leguminous plant, the sheaths overlapping; blades oblong, 1.5 to 3 cm. long, 5 to 10 mm. wide, somewhat pointed, glaucous beneath; pistillate spikelets 7 to 10 mm. long, the fruit a little shorter than the glume and sterile lemma.

Nicaragua, (Sandy Bay); Costa Rica, (Hamburg Finca, Prov. Limón); wet forest at low altitudes. Known only from Costa Rica, the type grown at Kew Gardens, said to come from San José.

2. **Raddia strictiflora** (Fourn.) Chase, Proc. Biol. Soc. Washington 21: 185. 1908.

Strephium strictiflorum Fourn. Bull. Soc. Bot. Belg. 15: 465. 1876.

Olyra strictiflora Hemsl. Biol. Cent. Amer. Bot. 3: 510. 1885.

Culms slender, 25 to 40 cm. tall; nodes puberulent; sheaths glabrous, puberulent on the margin and near the summit; blades thin, oblong-elliptic, 4 to 7 cm. long, 1 to 2 cm. wide, glabrous, the short petiole puberulent; panicles narrow; staminate spikelets 3 to 4 mm. long; pistillate spikelets about 1 cm. long.

Honduras, (Puerta Sierra); moist forest at low altitudes. Also Mexico, whence the type.

3. **Raddia costaricensis** Hitchc. Proc. Biol. Soc. Washington 40: 87. 1927.

Erect cespitose perennial; culms stiff, sometimes bent at the nodes, glabrous, 20 to 30 cm. tall; sheaths densely hirsute; blades crowded, rather firm and stiffly spreading, oblong-lanceolate, rounded at base, acute, 3 to 4 cm. long, 4 to 6 mm. wide, villous beneath, glabrous or sparsely hirsute on the upper surface, revolute in drying; staminate panicles narrow, pale, the spikelets 3 to 4 mm. long; pistillate panicles consisting of a few, (apparently 1 or 2), pistillate spikelets and several staminate ones below, the pistillate spikelets glabrous, 7 mm. long, with an apiculation 1.5 mm. long; staminate spikelet glabrous, pale, 3 mm. long.

Costa Rica (Río Hondo, near Madre de Diós, forest, 200 meters, the type.)

95. IMPERATA Cyrillo, Pl. Rar. Neap. 2: 26. 1792

Spikelets all alike, awnless, in pairs, unequally pedicellate on a slender continuous rachis, surrounded by long silky hairs; glumes about equal, membranaceous; sterile lemma, fertile lemma and palea thin and hyaline. Slender, erect perennials with terminal narrow silky panicles. Species seven, in the tropical regions of both hemispheres.

Panicle rarely more than 15 cm. long; spikelets 4 mm. long----1. I. brasiliensis.
Panicle as much as 40 cm. long; spikelets 3 mm. long--------2. I. contracta.

1. **Imperata brasiliensis** Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 2: 331. 1832.

Erect, tufted, with scaly rhizomes; culm slender, simple, 0.5 to 1 meter tall; leaves mostly clustered toward the base, the blades flat, 5 to 10 mm. wide; panicle pale, narrow.

Guatemala; pine ridges. Mexico to Florida and south to Argentina. Type from Brazil.

2. Imperata contracta (H. B. K.) Hitchc. Rep. Mo. Bot. Gard. 4: 146. 1893.
Saccharum contractum H. B. K. Nov. Gen. & Sp. 1: 182. 1816.
Imperata caudata Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 2: 331. 1832.

Taller than the preceding, the culms 1 to 1.5 meters tall, leafy; panicle as much as 40 cm. long.

El Salvador, Costa Rica; Panama; low meadows and open grassland. Mexico and the West Indies to Brazil and Chile. Type from Colombia.

96. SACCHARUM L. Sp. Pl. 54. 1753

Spikelets in pairs, one sessile, the other pedicellate, both perfect, awnless, arranged in panicled racemes, the axis disarticulating below the spikelets; glumes somewhat indurate, sterile lemma similar but hyaline; fertile lemma hyaline, sometimes wanting. Tall perennials with feathery panicles. Species about 10, in tropical regions, mostly in the eastern hemisphere.

1. Saccharum officinarum L. Sp. Pl. 54. 1753. SUGARCANE.

Gigantic perennial with broad leaves, the overlapping sheaths falling from the short-jointed lower part of the culms, the great plumy panicles pinkish silvery; forming seed sparingly. Sugar cane, caña de azúcar. Cultivated throughout tropical regions.

97. ERIOCHRYSIS Beauv. Ess. Agrost. 8. *pl. 4. f. 11.* 1812

Spikelets awnless, the sessile spikelets perfect, the pedicellate spikelets pistillate, smaller but fruitful, readily falling, the rachis rather tardily disjointing; racemes short, crowded in a narrow, dense, silky interrupted spikelike panicle. Erect perennials with yellow or brown compact woolly inflorescence. Species 4, 1 in South Africa, 3 in tropical America.

1. Eriochrysis cayennensis Beauv. Ess. Agrost. 8. *pl 4. f. 11.* 1812.

Erect perennial; culms simple, 1 to 2 meters or more tall, blades narrow, densely velvety; panicle 10 to 12 cm. long, compact, silky golden brown.

Guatemala, Costa Rica, Panama; open grassy marshes. Mexico and the West Indies to Uruguay.

98. POLYTRIAS Hack. in Engl. & Prantl, Pflanzenfam. 2²: 24. 1887

Spikelets in threes at each joint of the articulate rachis, two sessile and one pedicellate, perfect; glumes awnless, equal, membranaceous; sterile lemma wanting; fertile lemma hyaline, bearing at the apex a well-developed awn. Low perennial with shining red-brown hairy racemes solitary at the ends of the branches. Species 1, Java.

1. Polytrias amaura (Bühse) Kuntze, Rev. Gen. Pl. 2: 788. 1891.
Andropogon amaurus Bühse; Miquel, Pl. Jungh. 360. 1854.
Andropogon diversiflorus Steud. Syn. Pl. Glum. 1: 370. 1854.
Polytrias praemorsa Hack. in DC. Monogr. Phan. 6: 189. 1889.
Polytrias diversiflora Nash, Torreya 5: 110. 1905.

Low, prostrate; culms 10 to 30 cm. long; blades flat, 2 to 5 cm. long and 2.5 to 4 mm. wide; racemes 2 to 5 cm. long.

Panama; cultivated as a lawn grass and becoming spontaneous.

99. ANDROPOGON L. Sp. Pl. 1045. 1753

Spikelets in pairs at each node of an articulate rachis, one sessile and perfect, the other pedicellate and either staminate, neuter, or reduced to the pedicel, the rachis and the pedicels of the sterile spikelets often villous, sometimes conspicuously so; glumes of the fertile spikelet coriaceous, narrow, awnless, the first rounded, flat, or concave on the back, several-nerved, the median nerve weak or wanting; sterile lemma hyaline; fertile lemma hyaline, narrow, usually bearing a bent and twisted awn from the apex or from between apical lobes; pedicellate spikelet usually awnless, sometimes staminate and about as large as the sessile spikelet, sometimes consisting of one or more reduced glumes, sometimes wanting, only the pedicel present. Usually coarse perennials, with solid culms, the spikelets arranged in racemes, these numerous aggregate on an exserted peduncle, or single, in pairs, or sometimes in threes or fours, the common peduncle usually inclosed by a spathelike sheath, these sheaths often numerous, forming a compound inflorescence, usually narrow, but sometimes in dense subcorymbose masses. Species about 150, in all warmer parts of the world.

Racemes solitary, terminating the culms and branches.
  Plants annual.
    Culms weak, decumbent; blades obtuse, mostly 1 to 3 cm. long; peduncles capillary, spreading ..... 1. A. brevifolius.
    Culms erect, relatively stout; blades acute, mostly 5 to 10 cm. long; peduncles slender but not capillary ..... 2. A. malacostachyus.
  Plants perennial.
    Rachis of racemes conspicuously flexuous, very slender, the spikelets spreading ..... 3. A. condensatus.
    Rachis straight, the spikelets appressed or narrowly ascending.
      Spikelets awnless; racemes about 1 cm. long ..... 7. A. virgatus.
      Spikelets awned.
        First glume of sessile spikelet villous ..... 4. A. hirtiflorus.
        First glume of sessile spikelet glabrous.
          Sessile spikelet about 5 mm. long; blades 2 to 5 mm. wide 5. A. semiberbis.
          Sessile spikelet about 4 mm. long, 1 mm. wide; blades mostly not more than 1.5 mm. wide ..... 6. A. tener.
Racemes more than one at the summit of the culms and branches.
  Racemes several to numerous in a fascicle or panicle.
    Spikelets awnless; racemes nearly glabrous (not woolly) 14. A. hypogynus.
    Spikelets awned.
      Racemes several to many, peduncled in a somewhat digitate fascicle 15. A. condylotrichus.
      Racemes numerous, sessile along the main line, forming an oblong rather dense woolly panicle ..... 16. A. saccharoides.
  Racemes in pairs (2 to 5 in *A. selloanus*, sometimes solitary in *A. furcatus* and *A. nodosus*) at the ends of the peduncles, the pairs usually supported by spathes, these often in compound clusters or panicles.
    Spikelets awnless.
      Plants robust, 1 to 2 meters tall; spathes aggregate in a corymbose, usually dense inflorescence ..... 8. A. bicornis.

Plants slender, usually less than 1 meter tall, spathes not aggregate.
Sessile spikelets about 3 mm. long; blades usually not more than 2 mm. wide, the apex acuminate----------9. A. leucostachyus.
Sessile spikelets about 4 mm. long; blades 3 to 5 mm. wide, the apex boat-shaped----------10. A. selloanus.
Spikelets awned.
Awns geniculate, twisted below; lower pair of spikelets alike.
Racemes 2 to 3 cm. long; awn 3 to 4 cm. long----17. A. angustatus.
Racemes 4 to 5 cm. long; awns about 2 cm. long------18. A. nodosus.
Awns straight, delicate; lower pair of spikelets like the other pairs.
Racemes only slightly hairy----------13. A. furcatus.
Racemes conspicuously hairy.
Racemes aggregate in a dense club-shaped or corymbose inflorescence, the ultimate spathes not more than 2 mm. wide, rarely equalling their racemes----------11. A. glomeratus.
Racemes not aggregate, the ultimate spathes 3 to 5 mm. wide, much exceeding their racemes----------12. A. virginicus.

1. **Andropogon brevifolius** Swartz, Prodr. Veg. Ind. Occ. 26. 1788.
Schizachyrium brevifolium Nees; Kunth, Enum. Pl. 1: 488. 1833.

Slender trailing or reclining glabrous branching annual; culms from 15 cm. to as much as 1 meter long; blades flat, obtuse; racemes delicate, 1 to 2 cm. long; spikelets about 3 mm. long; awns 4 to 8 mm. long.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; moist banks, moist open thickets, and open ground. Tropical regions of both hemispheres. Type from Jamaica.

2. **Andropogon malacostachyus** Presl, Rel. Haenk. 1: 337. 1830.
Schizachyrium malacostachyum Nash, N. Amer. Fl. 17: 102. 1912.

Rather slender erect or spreading, glabrous, pale or reddish brown annual; culms 30 to 100 cm. long; blades flat, 1 to 4 mm. wide; racemes slender, 2 to 3 cm. long, more or less inclosed in the spathes on the erect branches along the upper part of the culm; sterile pedicels and joints of the rachis villous; sessile spikelet 7 mm. long, the awn about 1 cm.

Guatemala; dry slopes and rocky hills. Mexico, whence the type, to Colombia.

3. **Andropogon condensatus** H. B. K. Nov. Gen. & Sp. 1: 188. 1816.
Schizachyrium condensatum Nees, Agrost. Bras. 333. 1829.

Robust tufted erect glabrous perennial 1 to 1.5 meters tall; culm repeatedly branching toward the summit, forming a large corymbose compound inflorescence; blades 10 to 20 cm. long, 5 to 10 mm. wide, usually stiffly spreading; racemes 2 to 3 cm. long, the slender rachis very flexuous, the pedicels and rachilla joints long-villous; awns delicate, about 12 mm. long.

Guatemala, British Honduras, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; open rather dry ground. Mexico and the Lesser Antilles to Argentina. Type from Colombia.

4. **Andropogon hirtiflorus** (Nees) Kunth, Rév. Gram. 1: Suppl. xxxix. 1830.
Streptachne domingensis Spreng.; Schult. Mant. 2: 188. 1824. Not *Andropogon domingensis* Steud. 1821.
Schizachyrium hirtiflorum Nees, Agrost. Bras. 334. 1829.
Schizachyrium domingense Nash, N. Amer. Fl. 17: 103. 1912.
Andropogon domingensis Hubb. Proc. Amer. Acad. 49: 493. 1913. Not *A. domingensis* Steud. 1821.

Slender erect tufted perennial; culms compressed, 0.5 to 1.5 meters tall; blades flat, 2 to 4 mm. wide; racemes mostly 4 to 8 cm. long; rachis joints and pedicels villous; sessile spikelet 5 to 6 mm. long, its first glume more or less villous on the rounded back; awn about 1 cm. long.

Guatemala, British Honduras, Costa Rica, Panama; dry plains and grassy hills. Southern United States, Mexico, and the West Indies to Paraguay and Peru. Type from Brazil.

5. Andropogon semiberbis (Nees) Kunth, Rév. Gram. Suppl. 1: xxxix. 1830.

Schizachyrium semiberbis Nees, Agrost. Bras. 336. 1829.

Closely resembling *A. hirtiflorus*, which may be a variety of this; usually stouter and taller, often glaucous, blades averaging wider; first glume of sessile spikelet smooth on the back; rachis joints and pedicels sparingly villous, the racemes appearing nearly smooth (those of *A. hirtiflorus* appearing whitish-villous).

Honduras, Nicaragua, Costa Rica, Panama; dry or rocky hills and plains. Florida, eastern Mexico, and the West Indies to Argentina and Ecuador; also tropical Asia and Africa. Type from Brazil.

6. Andropogon tener (Nees) Kunth, Rév. Gram. 1: Suppl. xxxix. 1830.

Schizachyrium tenerum Nees, Agrost. Bras. 336. 1829.

Densely tufted bunch-grass; culms slender, reclining, 30 to 100 cm. long; blades subinvolute, 1 to 3 mm. wide; racemes slender, 2 to 5 cm. long, nearly glabrous; lower half of first glume of sessile spikelet light colored, giving the raceme a somewhat zonate appearance; awn about 1 cm. long.

Panama; grassy hills, open slopes, and rocky cliffs. Southern United States, Panama, and the Greater Antilles to Argentina. Type from Brazil.

7. Andropogon virgatus Desv.; Hamilt. Prodr. Pl. Ind. Occ. 9. 1825.

Hypogynium spathiflorum Nees, Agrost. Bras. 366. 1829.

Andropogon spathiflorus Kunth, Rév. Gram. 1: Suppl. xl. 1830.

Glabrous tufted perennial; culms compressed, rigid, about 1 meter tall; blades 2 to 4 mm. wide; inflorescence elongate, of numerous glabrous racemes about 1 cm. long, partly inclosed in rufous or purplish spathes; spikelets 3 to 4 mm. long, awnless.

Costa Rica, Panama; wet prairie. West Indies and Costa Rica to Brazil. Originally described from the "Antilles."

8. Andropogon bicornis L. Sp. Pl. 1046. 1753.

Robust tufted perennial; culms mostly 1 to 2 meters tall; blades 2 to 5 mm. wide, scabrous on the margin; inflorescence large, corymbose of delicate flexuous racemes 2 to 3 cm. long, whitish or tawny, feathery with hairs as much as 5 mm. long; one, sometimes two, of the uppermost pediceled spikelets larger than the fertile ones, the other pediceled spikelets rudimentary. In some of the West Indies called foxtail.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; grassy spots, moist savannas and waste land. Southern Mexico and the West Indies to Argentina and Bolivia. Type from Jamaica.

9. Andropogon leucostachyus H. B. K. Nov. Gen. & Sp. 1: 187. 1816.

Slender, densely tufted erect perennial; clums 30 to 50 cm. tall; blades 1 to 3 mm. wide, with a deeply impressed midvein; ligule about 2 mm. long; racemes 2 or 3, whitish 1.5 to 3 cm. long, on slender exserted peduncles, the spikelets obscured by the copious long silky hairs.

Guatemala, British Honduras, Costa Rica, Panama; dry hills and rocky slopes. Southern Mexico and the West Indies to Argentina and Bolivia. Type from Venezuela.

10. Andropogon selloanus (Hack.) Hack. Bull. Herb. Boiss. II. 4: 266. 1904.

Andropogon leucostachyus selloanus Hack. in DC. Monogr. Phan. 6: 420. 1889.

Similar to *A. leucostachyus*, differing in the somewhat stouter culms, shorter and broader blades with a boat-shaped tip, shorter ligule (less than 1 mm. long); racemes often 3 to 5, more densely villous, tawny rather than white.

Panama; dry hills and open dry woods. Panama and the West Indies to Paraguay. Type from Brazil.

11. Andropogon glomeratus (Walt.) B. S. P. Prel. Cat. N. Y. 67. 1888.

Cinna glomerata Walt. Fl. Carol. 59. 1788.

Andropogon macrourus Michx. Fl. Bor. Amer. 1: 56. 1803.

Andropogon tenuispathcus Nash, N. Amer. Fl. 17: 113. 1912.

Rather robust, densely tufted perennial; culms compressed, 1 to 1.5 meters tall; lower sheaths crowded, keeled; blades flat or folded, mostly 3 to 5 mm. wide; inflorescence dense, feathery, club-shaped; racemes in pairs, 1.5 to 3 cm. long, villous with whitish or tawny hairs; rachis slender, flexuous; sessile spikelet 3 to 4 mm. long, the awn about 1.5 cm. long.

Guatemala, British Honduras, El Salvador, Costa Rica, Panama; open places and grassy banks. Southeastern United States through Mexico and the West Indies to northern South America. Type from South Carolina.

12. Andropogon virginicus L. Sp. Pl. 1046. 1753.

Densely tufted, with a mass of long leaves at the base; culms 1 to 1.5 meters tall; sheaths compressed-keeled, glabrous or somewhat appressed-villous; blades 2 to 4 mm. wide; inflorescence slender, one-third to half the length of the plant; racemes 1.5 to 3 cm. long, more or less included in the spathes; rachis slender, flexuous, this and the pedicels villous with white hairs 3 to 5 mm. long; awn delicate, straight, 10 to 15 mm. long.

British Honduras, Costa Rica, Panama; sterile hills and open ground. Eastern United States to Panama and the West Indies. Type from Virginia.

13. Andropogon furcatus Muhl. in Willd. Sp. Pl. 4: 919. 1806.

Erect perennial about 1 meter tall; blades flat; racemes in pairs, or sometimes threes at the summit of the culm, often solitary on the axillary branches, 5 to 6 cm. long, somewhat pubescent but not conspicuously woolly; sessile spikelets about 8 mm. long, the awn somewhat bent, about 1 cm. long, weak; sterile spikelet about as long as fertile one.

Honduras (Dept. Comayagua); pine forest. United States to southern Mexico.

14. Andropogon hypogynus Hack. in Mart. Fl. Bras. 2^3: 290. *pl. 66.* 1883.

Hypogynium campestre Nees, Agrost. Bras. 365. 1829. Not *Andropogon campestris* Kunth, 1830, nor Trin. 1832.

Andropogon hypogynus genuinus Hack. in Mart. Fl. Bras. 2^3: 290. *pl. 66.* 1883.

Andropogon hypogynus anatherus Hack. in Mart. Fl. Bras. 2^3: 290. *pl. 66.* 1883.

Rather stout glabrous perennial; culms 1 to 2 meters tall; blades flat, 20 to 40 cm. long, 4 to 5 mm. wide; racemes several, in terminal fascicles, unequal, the longer as much as 6 cm. long; rachis nearly straight, the joints and the pedicel rather sparsely villous; sessile spikelets about 4 mm. long, the pediceled about as long but wider.

Guatemala (Dept. Izabel); open grassy plain. Brazil, whence the type.

The Guatemala specimen is awnless (var. *anatherus*). The Brazil specimens may be awnless or with an awn about equaling the spikelet.

15. Andropogon condylotrichus Hochst.; Steud. Syn. Pl. Glum. 1: 377. 1854.
Andropogon piptatherus Hack. in Mart. Fl. Bras. 2[3]: 293. 1883.
Amphilophis piptatherus Nash, N. Amer. Fl. 17: 127. 1912.
Euclasta condylotricha Stapf in Prain, Fl. Trop. Afr. 9: 181. 1917.

Weak-stemmed branching annual; culms 1 to 2 meters long, the nodes villous; blades 15 to 20 cm. long, 4 to 8 mm. wide, setaceous-pointed; racemes several, fascicled, 2 to 5 cm. long, on slender flexuous peduncles; pediceled spikelets about 5 mm. long; spikelets, rachis joints, and pedicels loosely pilose.

Nicaragua (Masaya); Panama; moist cliffs and shady banks. Mexico and the Greater Antilles to Colombia and Venezuela; also tropical Africa. Type from Abyssinia.

16. Andropogon saccharoides Swartz, Prodr. Veg. Ind. Occ. 26. 1788.
Andropogon argenteus DC. Cat. Hort. Monsp. 77, 1813.
Andropogon barbinodis Lag. Gen. & Sp. Nov. 3. 1816.
Amphilophis saccharoides Nash, N. Amer. Fl. 17: 125. 1912.

Erect perennial; culms simple, brittle, 1 to 2 meters tall; nodes white-hispid; blades flat, glabrous or nearly so, 2 to 8 mm. wide; panicles exserted, 5 to 15 cm. long. oblong, pale, silky, of numerous crowded, ascending racemes; awns 1.5 to 2 cm. long. In some specimens from Guatemala there is a minute depression (pinhole) in the back of the glume of the sessile spikelet.

Guatemala, El Salvador, Nicaragua, Panama; fields, meadows, and grassy banks. Southwestern United States and the West Indies to Argentina. Type from Jamaica.

16a. Andropogon saccharoides laguroides (DC.) Hack. in Mart. Fl. Bras. 2[3]: 293. 1883.
Andropogon laguroides DC. Cat. Hort. Monsp. 78. 1813.
Andropogon torreyanus Steud. Nom. Bot. ed. 2. 1: 93. 1840.

Differs in its usually smaller size, more slender culms and glabrous nodes.

Guatemala, Honduras; same range as the species. Type from Mexico.

16b. Andropogon saccharoides berteronianus (Steud.) Hack. in DC. Monogr. Phan. 6: 494. 1889.
Andropogon berteronianus Steud. Syn. Pl. Glum. 1: 380. 1854.

Blades densely pubescent or villous on both surfaces.

Guatemala (Guatemala City). Dry grass land. Tropical South America. Type from Chile.

17. Andropogon angustatus (Presl) Steud. Syn. Pl. Glum. 1: 370. 1854.
Diectomis laxa Nees, Agrost. Bras. 340. 1829. Not *Andropogon laxus* Willd. 1806.
Diectomis angustata Presl, Rel. Haenk. 1: 333. 1830.
Andropogon apricus Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 2[1]: 83. 1836.

Erect slender perennial about 1 meter tall; blades flat, elongate, 1 to 2 mm. wide; racemes in pairs, 2 to 3 cm. long, the pairs on slender branches from several of the upper leaves, forming a loose inflorescence, each branch at first inclosed in a spathe but finally exserted 5 to 10 cm.; 1 or 2 pairs of homogamous sterile spikelets at base of each raceme; pedicels and joints of rachis stiffly ciliate with whitish hairs; fertile (sessile) spikelet about 6 mm. long, laterally compressed, nearly glabrous, the callus sharp, barbate, 1 mm. long; first glume narrow, deeply sulcate on the back; second glume compressed, keeled, bearing from the apex a slender diverent awn 1 cm. long; awn of fertile floret geniculate, twisted, brown, scabrous-hispidulous, 3 to 4 cm. long.

Guatemala, El Salvador, Panama; dry savannas. Mexico to Brazil. Type from Mexico.

This species shows a close superficial resemblance to *Hyparrhenia rufa* but differs in the compressed instead of depressed sessile spikelets. The type of *Diectomis laxa* Nees was examined at Munich Herbarium, of *D. angustata* Presl at the herbarium of the German University at Prague, and of *Andropogon apricus* Trin. at the herbarium of the Academy of Sciences at St. Petersburg.

18. Andropogon nodosus (Willem.) Nash, N. Amer. Fl. 17: 122. 1912.

Dichanthium nodosum Willem. Ann. Bot. Usteri 18: 11. 1796.

Decumbent freely branching low perennial; blades flat, 2 to 8 cm. long; racemes 1 to 4, usually 2 or 3, 4 to 5 cm. long, the peduncle pubescent toward apex; spikelets broad, the sterile spikelets as conspicuous as the fertile ones, giving the appearance of a flat 2-ranked scaly spike; awns slender, about 2 cm. long, twisted and bent.

Honduras (Tela); introduced from the Old World into a few places in tropical America.

ANDROPOGON ATTENUATUS Bertol. Mem. Accad. Sci. Bologna 10: 34 *pl. 6.* 1859.

This species has not been identified. Judging from the plate the specimen illustrated appears to be affected by a fungus. The type was collected in Guatemala by Vellasquez.

100. DIECTOMIS H. B. K. Nov. Gen. & Sp. 1: 193. *pl. 64.* 1816

(*Diectomis* Beauv. Ess. Agrost. 132. *pl. 23. f. 5.* 1812. This is such a complex of errors that it seems best to discard the name as not effectively published.[3] *Diectomis* Kunth. Mém. Mus. Hist. Nat. 2: 69. 1815. Not effectively published, no specific name being mentioned.)

Spikelets arranged as in *Andropogon;* raceme solitary, subtended by a spathe; first glume of pediceled spikelet large, flat, herbaceous, many-nerved, awned from between 2 slender teeth; first glume of fertile (sessile) spikelet narrow, 2-keeled; second glume laterally compressed, the midnerve wing-keeled, awned; fertile lemma with a bent awn more than twice as long as those of the glumes. A single species.

1. Diectomis fastigiata (Swartz) H. B. K. Nov. Gen. & Sp. 1: 193. *pl. 64.* 1816.

Andropogon fastigiatus Swartz, Prodr. Veg. Ind. Occ. 26. 1788.

Slender erect glabrous annual; culms 0.5 to 1.5 meters tall, freely branching above; ligules firm, up to 2 cm. long; blades flat, 1 to 4 mm. wide; racemes 2 to 6 cm. long; joint of rachilla and sterile pedicel winged at the summit, long-villous, the white hairs as much as 7 mm. long; the conspicuous pediceled spikelet 8 mm. long; awn of fertile lemma geniculate, 4 to 5 cm. long.

Guatemala, El Salvador, Nicaragua, Costa Rica, Panama; dry hills, plains, and open ground. Mexico and the West Indies to Brazil, also tropics of Old World. Type from Jamaica.

101. CYMBOPOGON Spreng. Pl. Pugill. 2: 14. 1815

Racemes in pairs subtended by spathes, these collected in a decompound inflorescence; spikelets in pairs as in *Andropogon*, but the lowermost pair of one or both racemes sterile and similar to the pediceled spikelets above; fertile (sessile), spikelets dorsally compressed, flat or dorsally grooved, sharply 2-keeled at the edges; fertile lemma narrow, the awn from between 2 teeth

[3] Chase in Niles, Contr. U. S. Nat. Herb. 24: 206. 1925.

or lobes. Perennial densely tufted usually aromatic grasses. Species about 36 in the warmer parts of the Old World.

1. **Cymbopogon citratus** (DC.) Stapf, Kew Bull. Misc. Inf. 1906: 322. 1906.
LEMON GRASS.

Andropogon citratus DC. Cat. Hort. Monsp. 78. 1813.

Stout perennial with leafy sterile shoots from a short rhizome; culms erect, 2 meters or more tall; blades long-attenuate toward the base and tapering upward to a setaceous point, as much as 1 meter long, 5 to 15 mm. wide, glabrous, scabrous on the margins and above toward the tip, the midrib rather stout below, whitish on the upper side; inflorescence 30 to 60 cm. long, nodding.

Honduras, El Salvador; cultivated here and there throughout tropical America, and in the Tropics of the Old World. The species appears to be always sterile in America and is only infrequently fertile in the Eastern Hemisphere. It is not known in the wild state. In India it is a source of one of the aromatic oils of commerce called lemon oil and is cultivated in America, usually under the name of lemon grass or zacate limón, because of its lemon scent.

102. HYPARRHENIA Fourn. Mex. Pl. 2: 67. 1886

Spikelets in pairs as in *Andropogon* but spikelets of the lower pairs alike, sterile, and awnless; fertile spikelets 1 to few in each raceme, terete or flattened on the back, the margins of the first glume rounded, not sharply inflexed nor keeled (keeled toward the summit in *H. rufa*), the base usually elongate into a sharp callus, the fertile lemma with a strong geniculate awn; sterile spikelets awnless, racemes in pairs, on slender peduncles, and subtended by a spathe. Tall perennials, the pairs of racemes and their spathes more or less crowded, forming a rather large inflorescence at the upper part of the plant. Species more than 60, mostly in Africa, a few in tropical America.

Awn stout, about 8 cm. long; 1 fertile spikelet to each raceme, the first glume with a deep narrow groove on the back ..... 1. H. ruprechtii.
Awn 1.5 to 2 cm. long.
Awned spikelets several to a raceme ..... 2. H. rufa.
Awned spikelets 1 to 2 to a raceme ..... 3. H. bracteata.

1. **Hyparrhenia ruprechtii** Fourn. Mex. Pl. 2: 67. 1886.

Andropogon ruprechtii Hack. Flora 68: 126. 1885.

Cymbopogon ruprechtii Rendle, Cat. Afr. Pl. Welw. 2: 160. 1899.

Stout glabrous perennial, 2 to 3 meters tall; blades mostly 3 to 8 mm. wide, flat; racemes in pairs, mostly inclosed in spathes 5 to 8 cm. long, the spathes crowded toward the ends of erect branches, these appressed along the upper part of the culms; raceme about 2 cm. long, glabrous, erect; sterile spikelets 12 mm. long; fertile spikelet one in each raceme with a slender sharp callus about 5 mm. long; first glume firm, 6 mm. long, a deep narrow groove in the back; awn stout, about 8 cm. long.

Guatemala, El Salvador, Nicaragua; dry plains and hills. Mexico, whence the type, to Paraguay, also in tropical Africa.

2. **Hyparrhenia rufa** (Nees) Stapf in Prain, Fl. Trop. Afr. 9: 304. 1918.

Trachypogon rufus Nees, Agrost. Bras. 345. 1829.

Andropogon rufus Kunth, Rév. Gram. 1: Suppl. xxxix. 1830.

Cymbopogon rufus Rendle, Cat. Afr. Pl. Welw. 2: 155. 1899.

Perennial; culms erect, rather stout, 1 to 2.5 meters tall; blades mostly 2 to 8 mm. wide, sometimes more than 1 cm.; inflorescence 20 to 40 cm. long, the pairs of racemes toward the ends of the numerous branches on long

slender flexuous peduncles; racemes about 2 cm. long, reddish brown; fertile spikelets mostly 5 to 7 in each raceme, 3 to 4 mm. long, flattened from the back, pubescent with dark red hairs, the pedicels and rachis-joints ciliate with red hairs; awn 15 to 20 mm. long, twice geniculate, twisted, red-brown, hispidulous. El Salvador; moist open ground. Venezuela to Brazil, whence the type, and Tropics of Old World.

Cultivated in El Salvador for forage where it is called Jaraguá. Commonly cultivated in Brazil for forage under the same name.

3. **Hyparrhenia bracteata** (Humb. & Bonpl.) Stapf. in Prain, Fl. Trop. Afr. 9: 360. 1918.

Andropogon bracteatus Humb. & Bonpl.; Willd. Sp. Pl. 4: 914. 1806.

Cymbopogon bracteatus Hitchc. Contr. U. S. Nat. Herb. 17: 209. 1913.

Stout perennial, 1 to 2 meters tall; sheaths more or less appressed-hirsute; blades 2 to 4 mm. wide, glabrous or villous; spathes 2 to 4 cm. long, crowded toward the summit of the culm, villous; racemes about 1 cm. long, the peduncle slender, flexuous, exerted from the side of the spathe, the racemes finally divergent or reflexed, peduncle, rachis joints, sterile pedicel and callus villous with brownish yellow hairs; fertile spikelet mostly 1 in a raceme, 5 mm. long, the awn about 2 cm. long.

Guatemala, Honduras, El Salvador, Costa Rica, Panama; fields, open places and grassy hills. Mexico to Paraguay. Type from Venezuela.

103. VETIVERIA Bory in Lem. Bull. Soc. Philom. 1822: 43. 1822

Racemes long, slender, solitary, on long filiform peduncles borne in whorls on an elongate axis, forming a large panicle; spikelets awnless (in ours), arranged as in *Andropogon*, the filiform rachis taridly disjointing. Coarse glabrous perennials with stout rhizomes. Species about 7 in the Tropics of the Old World.

In the Grasses of the West Indies[4] this genus was described under *Anatherum* Beauv. This name was there typified by *A. muricatum* Beauv., the first of two equally eligible species. It seems better to take the second of these species, *A. bicorne* Beauv. (*Andropogon bicornis* L.) as the type, reducing *Anatherum* Beauv. to a synonym of *Andropogon* and leaving *Vetiveria* for the aromatic grass commonly known under that name.

1. **Vetiveria zizanioides** (L.) Nash in Small, Fl. Southeast. U. S. 67. 1903.

VETIVER.

Phalaris zizanioides L. Mant. Pl. 183. 1771.

Vetiveria arundinacea Griseb. Fl. Brit. W. Ind. 559. 1864.

Anatherum zizanioides Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 285. 1917.

Robust, densely tufted, erect, branching perennial; culms 1 to 2 meters tall, blades glabrous, firm or rigid, 30 to 100 cm. long, 4 to 10 mm. wide, scabrous on the margin; panicle elongate-pyramidal, 20 to 30 cm. long, the branches in 6 to 10 whorls of as many as 20 rays, the lower naked part as much as 5 cm.; racemes as much as 5 cm. long.

El Salvador. A native of Asia, cultivated in the Tropics of both hemispheres.

Commonly cultivated as a hedge plant and for its aromatic roots. Sometimes escaped along roadsides. The roots are sometimes packed with articles of clothing to preserve them from moths and are sometimes woven into screens which, when wet, are used to perfume living quarters. Khus-khus, vetiver, zacate violeta.

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[4] Contr. U. S. Nat. Herb. 18: 285. 1917.

104. SORGHUM Moench, Meth. Pl. 207. 1794

Spikelets in pairs, one sessile and fertile, the other pedicellate, sterile but well developed, usually staminate, the terminal sessile spikelet with two pedicellate spikelets; annual or perennial, tall or moderately tall grasses, with flat blades and terminal panicles of 1 to 5 jointed tardily disarticulating racemes. Species about six, mostly African, only one American. The numerous varieties of the cultivated *Sorghum* are considered species by some.

Plants perennial, with creeping rhizomes.....1. S. halepense.
Plants annual.....2. S. vulgare.

1. Sorghum halepense Pers. Syn. Pl. 1: 101. 1805. JOHNSON GRASS.

Holcus halepensis L. Sp. Pl. 1047. 1753.

Andropogon halepensis Brot. Fl. Lusit. 1: 89. 1804.

Robust perennial with numerous stout rhizomes; culms mostly 1 to 1.5 meters tall; blades mostly less than 1.5 cm. wide, the midrib prominent, white margins scabrous; panicle 15 to 25 cm. long; fertile spikelets plump, 5 mm. long the awn when present 7 to 10 mm. long, deciduous; staminate spikelets 4 mm. long, the pedicel 3 mm. long.

El Salvador, Nicaragua, Costa Rica, Panama; fields and waste places. Originally from the Mediterranean region, now established throughout the warmer parts of America.

2. Sorghum vulgare Pers. Syn. Pl. 1: 101. 1805. SORGHUM.

Holcus sorghum L. Sp. Pl. 1047. 1753.

Andropogon sorghum Brot. Fl. Lusit. 1: 88. 1804.

Guatemala, El Salvador, Costa Rica; cultivated in the warmer regions of both hemispheres and occasionally escaped in fields and waste places in tropical America. The foliage is used for forage and the seed for stock feed and sometimes for human food. Called also sorgho, guinea corn, maicillo.

There are numerous varieties. One variety, Sudan grass (*S. vulgare sudanense* (Piper) Hitchc.) is a comparatively slender form 2 to 4 meters tall, with a large open panicle, used for forage. Another variety, broomcorn, has a large erect or fan-shaped panicle with long naked branches, the spikelets crowded near the ends.

105. SORGHASTRUM Nash in Britton, Man. 71. 1901

Spikelets in pairs, one nearly terete, sessile and fertile, the other wanting, only the hairy pedicel being present; glumes coriaceous, brown or yellowish, the first hirsute, the edges inflexed over the second; sterile and fertile lemmas thin and hyaline, the latter extending into a usually well-developed bent and twisted awn. Perennial, erect, rather tall grasses, with narrow flat blades and narrow terminal panicles of one to few jointed racemes. Species about 10 in the warmer parts of the Western Hemisphere and a few in Africa.

Plants annual, spreading or straggling; spikelets 4 mm. long, the awn 3 cm. long.....1. S. incompletum.
Plants perennial, erect; spikelets 5 to 6 mm. long, the awn 10 to 15 mm. long.
2. S. nutans.

1. Sorghastrum incompletum (Presl) Nash, N. Amer. Fl. 17: 130. 1912.

Andropogon incompletus Presl, Rel. Haenk. 1: 342. 1830.

Andropogon nutans incompletus Hack. in DC. Monogr. Phan. 6: 531. 1889.

Culms often 1 to 2 meters long; blades rather short, 2 to 5 mm. wide; panicles 5 to 15 cm. long; pedicels capillary, flexuous; spikelets readily disarticulating, forming with the awns, implicate clusters.

Guatemala, El Salvador, Nicaragua, Costa Rica, Panama; dry hills and open grassy places. Mexico, whence the type, to Venezuela; also in tropical Africa.

2. **Sorghastrum nutans** (L.) Nash in Small, Fl. Southeast. U. S. 66. 1903.

Andropogon nutans L. Sp. Pl. 1045. 1753.

Culms 1 to 2 meters tall, strict; blades 5 to 10 mm. wide, scabrous; panicle 20 to 30 cm. long, the pedicels slender but nearly straight; spikelets tawny or yellow-brown at maturity, hirsute.

Guatemala, Honduras, Panama; dry hills and plains. United States to Panama. Type from Virginia.

106. HETEROPOGON Pers. Syn. Pl. 2: 533. 1807

Spikelets in pairs, one sessile, the other pedicellate, both of the lower few to several pairs staminate or neuter, the remainder of the sessile spikelets perfect, terete, long-awned, the pedicellate spikelets, like the lower, staminate, flat, conspicuous, awnless; glumes of the fertile spikelet equal, coriaceous, the first brown-hirsute, infolding the second; lemmas thin and hyaline, the fertile one narrow, extending into a strong bent and twisted brown awn; glumes of the staminate spikelet membranaceous, the first green, faintly many nerved, asymmetric one submarginal keel rather broadly winged, the other wingless, the margins inflexed, the second glume narrower, symmetric. Annual or perennial, often robust grasses, with flat blades and solitary racemes terminal on the culms and branches; rachis slender, the lower part, bearing the pairs of staminate spikelets, continuous, the remainder disarticulating obliquely at the base of each joint, the joint forming a sharp barbed callus below the fertile spikelet, the pedicellate spikelet readily falling. Species about seven, in the warmer regions of both hemispheres.

Plants perennial, 60 to 100 cm. tall; first glume of staminate spikelet pilose. 1. H. contortus.

Plants annual, 1.5 to 2.5 meters tall; first glume of staminate spikelet beset with a row of glands along the back, not pilose_____2. H. melanocarpus.

1. **Heteropogon contortus** (L.) Beauv.; Roem. & Schult. Syst. Veg. 2: 836. 1817.

Andropogon contortus L. Sp. Pl. 1045. 1753.

Branching perennial; culms compressed, 40 to 100 cm. tall; blades 2 to 4 mm. wide, scabrous; racemes solitary, excluding awns, 3 to 8 cm. long, somewhat curved; spikelets imbricate, the lower awnless, the upper with long brown bent awns, 5 to 8 cm. long, red-brown. Lemon-scented when fresh.

Guatemala, Honduras, El Salvador, Nicaragua; rocky slopes and cliffs. Southwestern United States and the West Indies to Argentina and Bolivia; warmer parts of the Old World. Type from India.

2. **Heteropogon melanocarpus** (Ell.) Benth. Journ. Linn. Soc. Bot. 19: 71. 1882.

Andropogon melanocarpus Ell. Bot. S. C. & Ga. 1: 146. 1816.

Culms stout, often glaucous, the lower nodes often producing stilt-roots; blades as much as 1 cm. wide; racemes several, combined with the spathes and upper leaves forming a rather dense inflorescence 20 to 30 cm. long; first glume of staminate spikelet 15 mm. long; mature fertile spikelet terete, dark brown, 6 to 7 mm. long with a sharp bearded callus about 2 mm. long; awn hispidulous 6 to 10 cm. long.

Nicaragua (Masaya); grassy slopes and open ground. Southern United States and Mexico to Bolivia; also tropical regions of the Old World. Type from Georgia.

107. TRACHYPOGON Nees, Agrost. Bras. 341. 1829

Spikelets in pairs, along a slender continuous rachis, one nearly sessile, staminate, awnless, the other pedicellate, perfect, long-awned; the pedicel of the perfect spikelet obliquely disarticulating near the base, forming a sharp barbed callus below the spikelet; first glume firm-membranaceous, rounded on the back, several-nerved, obtuse; second glume firm, obscurely nerved; fertile lemma narrow, extending into a stout twisted and bent or flexuous awn; sessile spikelet persistent, as large as the fertile spikelet and similar but awnless. Perennial, moderately tall grasses, with terminal spikelike racemes, these single or clustered. Species about seven, Mexico to South America.

Racemes 2 or 3----------1. T. plumosus.
Raceme solitary.
  Awn 10 to 12 cm. long, conspicuously plumose----------3. T. gouinii.
  Awn shorter, appressed-plumose below, scabrous above-----2. T. montufari.

1. **Trachypogon plumosus** (Humb. & Bonpl.) Nees, Agrost. Bras. 344. 1829.
  Andropogon plumosus Humb. & Bonpl.; Willd. Sp. Pl. 4: 918. 1806.
  Trachypogon polymorphus plumosus Hack. in Mart. Fl. Bras. 2^3: 265. 1883.
  Culms erect, glabrous, 1 to 1.5 meters; blades elongate, mostly 5 to 7 mm. wide; racemes 10 to 20 cm. long; awns mostly 4 to 7 cm. long, pilose.
  British Honduras, El Salvador, Panama; dry plains and hills. Mexico to Brazil and Bolivia. Type from Venezuela.
  Used for thatching huts.

2. **Trachypogon montufari** (H. B. K.) Nees, Agrost. Bras. 342. 1829.
  Andropogon montufari H. B. K. Nov. Gen. & Sp. 1: 184. 1816.
  Similar to *T. plumosus* but often lower and more slender; foliage glabrous or scabrous; raceme solitary, 10 to 15 cm. long; glumes pubescent.
  Guatemala, El Salvador, Costa Rica, Panama; dry plains and hills. Southwestern United States to Uruguay. Type from Ecuador.

2a. **Trachypogon montufari mollis** (Nees) Anderss. Öfv. Svensk. Vet. Akad. Förh. 14: 49. 1857.
  Trachypogon mollis Nees, Agrost. Bras. 343. 1829.
  Foliage villous.
  El Salvador, Costa Rica; grassy plains. Central America, Brazil, whence originally described, and Paraguay.

3. **Trachypogon gouinii** Fourn. Mex. Pl. 2: 66. 1886.
  Tall slender glabrous perennial, sparingly producing scaly rhizomes; culms simple, usually geniculate below; blades involute; raceme narrow, pale, feathery, 15 to 30 cm. long.
  Honduras (Puerto Cortez); sandy flats at low altitudes. Mexico, the type from Vera Cruz, Cuba, and Central America.

108. ELYONURUS Humb. & Bonpl.; Willd. Sp. Pl. 4: 941. 1806

Spikelets in pairs along a somewhat tardily disarticulating rachis, the joints and pedicels thickened and parallel, the sessile spikelets appressed to the concave side, the pedicellate spikelet staminate, similar to the sessile one, both awnless, the pair falling with a joint of the rachis; first glume firm, somewhat coriaceous, depressed on the back, the margins inflexed around the second glume, a line of balsam glands on the marginal nerves, the apex entire and acute or acuminate, or bifid with aristate teeth; second glume similar to the first; sterile and fertile lemmas thin and hyaline. Erect, moderately tall perennials, with solitary spikelike, often woolly racemes. Species about 15, in the warmer regions of both hemispheres.

1. Elyonurus tripsacoides Humb. & Bonpl.; Willd. Sp. Pl. 4: 941. 1806.

Erect glabrous bunchgrass about 1 meter tall; blades slender, flat or folded, firm, 1 to 3 mm. wide; raceme 5 to 12 cm. long; sessile spikelets 5 to 8 mm. long, glabrous on the back, the rachis and sterile pedicel pubescent or villous.

Guatemala, Panama; grassy plains and hills, southern United States and Mexico to Argentina and Bolivia. Type from Venezuela.

1a. Elyonurus tripsacoides ciliaris Hack. in DC. Monogr. Phan. 6: 333. 1889.

Elyonurus ciliaris H. B. K. Nov. Gen. & Sp. 1: 193. 1816.

Spikelets pubescent on the back.

Guatemala, Panama, grassy plains and hills, Mexico to Venezuela, whence the type.

109. ISCHAEMUM L. Sp. Pl. 1049. 1753

Sessile spikelets perfect, awned; pedicellate spikelets perfect but not always fruitful; rachis disjointing; racemes 2 to several, digitate or aggregate on a short axis. Culms branching, with flat blades and digitate or flabellate inflorescence with prominent awns. Species about 50, tropics of the Old World, and 3 or 4 species in the American tropics.

Racemes several in a cluster at the apex of the culms_____1. I. latifolium.
Racemes 2.

First glume strongly rugose across the back_____2. I. rugosum.

First glume smooth across the back, longitudinally striate above_3. I. ciliare.

1. Ischaemum latifolium (Spreng.) Kunth, Rév. Gram. 1: 168. 1829.

Andropogon latifolius Spreng. Syst. Veg. 1: 286. 1825.

Spreading and straggling, branching, decumbent, rooting at the lower nodes; blades glabrous, flat, oblong-lanceolate, as much as 20 cm. long and 3 cm. wide; racemes 5 to 15, 4 to 8 cm. long.

Guatemala, British Honduras, Honduras, Nicaragua, Costa Rica; moist shady places, Southern Mexico and the West Indies to Brazil and Ecuador, Type from Martinique or Guadeloupe.

Sometimes utilized for fodder. "Carricillo" (Guatemala).

2. Ischaemum rugosum Salisb. Icon. Stirp. Rar. 1: *pl. 1.* 1791.

Branching annual; culms 0.5 to 1 meter tall; geniculate below; nodes bearded; blades flat, 8 to 12 mm. wide, sparsely pilose; racemes 5 to 10 cm. long, erect, so closely appressed to each other as often to appear like a single spike; spikelets 3 to 4 mm. long, obtuse, the awn about 1.5 cm. long.

Panama; old fields and waste land. Introduced from the Old World. Also Cuba and Jamaica.

3. Ischaemum ciliare Retz. Obs. Bot. 6: 36 [26]. 1791.

Slender much-branched perennial with creeping rooting bases; fertile culms 30 to 60 cm. tall; blades flat, 3 to 10 cm. long, 4 to 8 mm. wide; racemes usually 2, 3 to 5 cm. long, green, finally spreading; spikelets about 4 mm. long; first glume broadly winged at the summit; awn 5 to 8 mm. long.

Panama; weed in lawns and open grassland. Introduced from the Old World. Also British Guiana.

110. HACKELOCHLOA Kuntze, Rev. Gen. Pl. 2: 776. 1891

(*Rytilix* Raf. Bull. Bot. Seringe 1: 219. 1830. This name is rejected because it was proposed without description, with the mention of two species (*Manisuris granularis* and *M. myurus*), which are not congeneric, and was placed among the sedges instead of among the grasses)

Spikelets awnless, in pairs, the rachis-joint and pedicel grown together, the two clasped between the edges of the globose alveolate first glume of the sessile spikelet; pedicellate spikelet conspicuous, staminate.

1. **Hackelochloa granularis** (L.) Kuntze, Rev. Gen. Pl. 776. 1891.
Cenchrus granularis L. Mant. Pl. 575. 1771.
Manisuris granularis Swartz, Prodr. Veg. Ind. Occ. 25. 1788.
Rytilix granularis Skeels, U. S. Dept. Agr. Bur. Pl. Ind. Bull. 282: 20. 1913.
Coarsely hispid, freely branching annual; culms 30 to 100 cm. tall; blades flat, mostly less than 10 cm. long, 5 to 10 mm. wide; racemes terminal and axillary, 1 to 2.5 cm. long.
Guatemala, British Honduras, Honduras, El Salvador, Nicaragua, Costa Rica, Panama; fields and waste places. Introduced from the Old World. Throughout tropical America and into the southern part of the United States.

111. ROTTBOELLIA L. f. Nov. Gram. Gen. 22. *pl. 1.* 1779; Amoen. Acad. 10: 22. 1790. A conserved name

(*Manisuris* L. Mant. Pl. 164. 1771)

Spikelets awnless, in pairs at the nodes of a thickened articulate rachis, one sessile and fertile, the other pedicellate and sterile, the pedicel thickened and appressed to the rachis, the sessile spikelet fitting closely against the rachis, forming a cylindric or subcylindric spike; glumes obtuse, the first coriaceous, fitting over the hollow containing the spikelet, the second less coriaceous than the first; sterile lemma, fertile lemma, and palea thin and hyaline, inclosed within the glumes; pedicellate spikelet reduced, often rudimentary. Slender perennials; with usually numerous smooth cylindric or flattened spikes, solitary on the culms and branches. Species about 30, in the warm regions of both hemispheres.

Racemes compressed, tardily disarticulating----------1. R. fasciculata.
Racemes cylindric or nearly so, readily disarticulating----------2. R. aurita.

1. **Rottboellia fasciculata** Lam. Tabl. Encycl. 1: 204. 1791.
Hemarthria fasciculata Kunth, Rév. Gram. 1: 153. 1829.
Rottboellia compressa fasciculata Hack. in DC. Monogr. Phan. 6: 286. 1889.
Manisuris fasciculata Hitchc. Amer. Journ. Bot. 2: 299. 1915.
Erect or spreading slender glabrous perennial; culms compressed, 0.5 to 1 meter tall; blades flat or folded, 2 to 5 mm. wide; racemes 5 to 10 cm. long, falcate, from several of the upper sheaths.
El Salvador; shallow water, ditches, and moist ground. An Old World species introduced into the American tropics. Mexico and Jamaica to Argentina and Bolivia.
Rottboellia compressa L. f., of tropical Asia, differs in having more slender racemes and smaller spikelets 4 to 4.5 mm. long, the first glume rounded or acute but scarcely acuminate.

2. **Rottboellia aurita** Steud. Syn. Pl. Glum. 1: 361. 1854.
Manisuris aurita Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 276. 1917.
Erect glabrous perennial 1 to 1.5 meters tall; blades flat or folded, 4 to 8 mm. wide; racemes mostly 5 to 10 cm. long, included at base in the upper sheaths or exserted; sessile spikelets 4 mm. long, the first glume smooth or indistinctly pitted.
Costa Rica, Panama; marshes and savannas. Central America to Argentina and Bolivia. Type from Brazil.

2a. **Rottboellia aurita stigmosa** Hack. in DC. Monogr. Phan. 6: 311. 1889.
Rottboellia stigmosa Trin.; Rupr. Bull. Acad. Sci. Brux. 9²: 243. 1844, nomen nudum.
Rottboellia ramosa Benth.; Hemsl. Biol. Centr. Amer. Bot. 3: 521. 1885. Not *R. ramosa* Cav. 1801.

Apogonia ramosa Fourn. Mex. Pl. 2: 63. 1886.
Coelorachis ramosa Nash, N. Amer. Fl. 17: 86. 1909.
Manisuris ramosa Hitchc. Proc. Biol. Soc. Washington 40: 88. 1927.

Sessile spikelets 5 mm. long, the first glume distinctly punctate with 4 or 5 rows of small pits.

Guatemala, (Dept. Izabel); marshes, low ground, and ditches. Mexico, whence the type, to Colombia.

112. TRIPSACUM L. Syst. Nat. ed. 10. 2: 1261. 1759

Spikelets unisexual; staminate spikelets 2-flowered, in pairs on one side of a continuous rachis, one sessile, the other sessile or pedicellate, similar to those of *Zea*, the glumes firmer; pistillate spikelets single and on opposite sides at each joint of the thick, hard articulate lower part of the same rachis, sunken in hollows in the joints, consisting of one perfect floret and a sterile lemma; first glume coriaceous, nearly infolding the spikelet, fitting into and closing the hollow of the rachis; second glume similar to the first but smaller, infolding the remainder of the spikelet; sterile lemma, fertile lemma, and palea very thin and hyaline, these progressively smaller. Robust perennial grasses, with usually broad flat blades and monoecious terminal and axillary inflorescences of 1 to several racemes, the pistillate part below, breaking up into bony, seedlike joints, the staminate above on the same rachis, deciduous as a whole. Species about seven, all American, extending from the middle United States to northern South America.

Blades mostly 1 to 2 cm. wide----------1. T. dactyloides.
Blades mostly 3 to 6 cm. wide.
  Staminate inflorescence close, both spikelets of each pair nearly sessile, abruptly rounded or obtuse at the summit, about 5 mm. long
    2. T. latifolium.
  Staminate inflorescence rather loose, spikelets rather soft, narrowed above into a short point, one of each pair nearly sessile, the other with a pedicel 1 to 3 mm. long.
    Sheaths glabrous----------3. T. laxum.
    Sheaths papillose-hispid----------4. T. pilosum.

1. Tripsacum dactyloides (L.) L. Syst. Nat. ed. 10. 2: 1261. 1759.
Coix dactyloides L. Sp. Pl. 972. 1753.

Cespitose, 1 to 3 meters tall, from very stout short rhizomes; sheaths glabrous; blades smooth or scabrous; lateral and sometimes terminal racemes solitary.

Guatemala (Dept. Quezaltenango); Panama (Balboa), open grassland; eastern United States, Mexico, and the West Indies to Paraguay and Bolivia. Type from "America."

2. Tripsacum latifolium Hitchc. Bot. Gaz. 41: 294. 1906.

Culms 2 to 4 meters tall, 2 to 3 cm. thick at base; blades as much as 70 cm. long, or the lower as much as 140 cm. and gradually narrowed at base, 2.5 to 6 cm. wide, glabrous or hispidulous; racemes 1 or 2 more slender than in *T. dactyloides*.

Guatemala (type from Cubilquitz), Honduras, Nicaragua; rocky slopes, especially in canyons. Western Mexico and Central America.

The tall stout stems and broad flat blades give the aspect of maize. Sometimes called teosinte which name should be reserved for *Euchlaena mexicana*.

3. Tripsacum laxum Nash, N. Amer. Fl. 17: 81. 1909.
Tripsacum fasciculatum Trin.; Aschers. Bot. Zeit. 35: 525. 1877. Not *T. fasciculatum* Rasp. 1825.

Culms stout, as much as 5 meters tall and 2.5 cm. thick at base; sheaths glabrous; blades glabrous or more or less hispidulous, as much as 9 cm. wide; racemes slender, few to 10 or 12.

Guatemala, Honduras, El Salvador, Costa Rica; grassy slopes. Mexico, whence the type, to Colombia.

Sometimes cultivated for forage and incorrectly called teosinte or perennial teosinte and maicillo.

4. **Tripsacum pilosum** Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 24: 6. *f. 1.* 1901.

Resembles *T. laxum* but the sheaths papillose-hispid.

Guatemala (Dept. Huehuetenango). Also Mexico, the type from Jalisco.

113. COIX L. Sp. Pl. 972. 1753

Spikelets unisexual; staminate spikelets 2-flowered, in twos or threes on the continuous rachis, the normal group consisting of a pair of sessile spikelets with a single pedicellate spikelet between, the latter sometimes reduced to a pedicel or wanting; glumes membranaceous, obscurely nerved; pistillate spikelets 3 together, 1 fertile and 2 sterile, inclosed in an oval, pearly white or drab, beadlike, very hard, tardily deciduous involucre (much modified sheathing bract), the peduncle of the staminate portion of the inflorescence protruding through the orifice at the apex.

Tall branched grasses with broad flat blades, the monoecious inflorescences numerous on long, stout, peduncles, these clustered in the axils of the leaves. Species about four, one widely distributed in tropical countries, the others in the East Indies.

1. **Coix lacryma-jobi** L. Sp. Pl. 972. 1753. JOBS-TEARS

Freely branching, 1 meter or more tall, the cordate, clasping blades 2 to 3 cm. broad, the "beads" 8 to 10 mm. long. The seeds are used for necklaces and for other ornamental purposes. Christ's tears; camandula; lágrimas de Job; lágrimas de San Pedro; zacate de perla.

Guatemala, Honduras, El Salvador, Costa Rica, Panama; waste places, ditches, and open ground, especially near dwellings. Originally from the tropics of the Old World, now cultivated and escaped throughout the American tropics.

114. EUCHLAENA Schrad. Ind. Sem. Hort. Goettingen 1832[5]

Staminate inflorescence as in *Zea;* pistillate spikelets single, on opposite sides and sunken in cavities in the hardened joints of an obliquely articulate rachis, the indurate first glume covering the cavity; second glume membranaceous, the lemmas hyaline; spikes infolded in foliaceous bracts or husks, 2 to several of these together inclosed in the leaf sheaths. Tall broad-leaved grasses with the aspect of maize (*Zea mays*). Species 2, Mexico.

1. **Euchlaena mexicana** Schrad. Ind. Sem. Hort. Goettingen 1832 (Linnaea 8: Litt. 25. 1833). TEOSINTE

Reana luxurians Durieu, Bull. Soc. Acclim. II. 9: 581. 1872.

Euchlaena luxurians Durieu & Aschers. Bull. Soc. Linn. Paris 1: 107. 1877.

Culms tufted, 1 to 3 meters tall; blades about as in *Zea mays;* "seeds" or hardened joints of the pistillate rachis triangular or trapezoidal, smooth and bony, whitish. A tall annual with somewhat the aspect of maize (*Zea mays*). This is occasionally cultivated for forage in the southern United States, and rarely in Central America, under the name teosinte.

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[5] See also Hitchcock, Journ. Washington Acad. Sci. 12: 205. 1922.

This species is of special interest because of its close relationship to maize, a species which has never been found growing in the wild state and the origin of which is not known. Collins[6] is of the opinion that maize is a hybrid between teosinte and an unknown or extinct species resembling pod-corn. A perennial species of teosinte (*E. perennis* Hitchc.) occurs in Mexico.

115. ZEA L. Sp. Pl. 971. 1753

Spikelets unisexual; staminate spikelets 2-flowered, in pairs, on one side of a continuous rachis, one nearly sessile, the other pedicellate; glumes membranaceous, acute; pistillate spikelets sessile, in pairs, consisting of one fertile floret and one sterile floret, the latter sometimes developed as a second fertile floret; glumes broad, rounded or emarginate at apex; sterile lemma similar to the fertile, the palea present; style very long and slender, stigmatic along both sides well toward the base. Tall annual, with broad, conspicuously distichous blades, monoecious inflorescences, the staminate flowers in spike-like racemes, these numerous, forming large spreading panicles (tassels) terminating the stems, the pistillate inflorescence in the axils of the leaves, the spikelets in 8 to 16 or even as many as 30 rows on a thickened, almost woody axis (cob), the whole inclosed in numerous large foliaceous bracts (husks), the long styles (silk) protruding from the top as a silky mass of threads. Only one species in numerous varieties. The original wild form is unknown but was probably a native of the Mexican or Central American highlands. (See note under *Euchlaena*.) Now commonly cultivated throughout warm and temperate regions. Corn, maize, or mais.

1. Zea mays L. Sp. Pl. 971. 1753. MAIZE.

Culms 1 to 3 meters tall; blades as much as 10 cm. wide, recurved; staminate racemes 10 to 15 cm. long, the central erect, the lateral drooping; pistillate inflorescence or ear and the grains or kernels variable according to the variety.

NOTE.—Specimens of *Sporobolus buckleyi* Vasey (*Lundell* 359) and *Ichnanthus lanceolatus* Scribn. & Smith (*Lundell* 566), collected at Honey Camp, British Honduras, were received too late to permit including these species in the text.

[6] Origin of Maize. Journ. Washington Acad. Sci. **2**: 520. 1912.

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37. Panicum hirsutum.
38. Panicum maximum.
58. Panicum polygonatum.
62. Panicum stoloniferum.
63. Panicum pulchellum.
76. Panicum megiston.
204. Panicum chloroticum.
209. Panicum trichanthum.
227. Panicum zizanioides.
237. Ischaemum rugosum.
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248. Andropogon brevifolius.
253. Diectomis fastigiata.
259. Andropogon semiberbis.
262. Andropogon leucostachyus.
269. Andropogon selloanus.
305. Hymenachne donacifolia.
306. Homolepis aturensis.
379. Bouteloua americana.
406. Ichnanthus pallens.
407. Ichnanthus pallens.
408. Ichnanthus tenuis.
412. Lasiacis oaxacensis.
416. Lasiacis sorghoidea.
417. Lasiacis sorghoidea.
421. Oplismenus burmanni.
424. Oplismenus hirtellus.
454. Orthoclada laxa.
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508. Panicum stenodoides.
509. Panicum milleflorum.
513. Panicum haenkeanum.
544. Panicum stagnatile.
545. Panicum grande.
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599. Isachne polygonoides.
622. Cenchrus viridis.
624. Olyra latifolia.
680. Leptochloa virgata.
713. Setaria paniculifera.
728. Setaria vulpiseta.
741. Aristida jorullensis.
742. Aristida jorullensis.
743. Aristida jorullensis.
900. Jouvea pilosa.

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587. Eragrostis maypurensis.
2012. Paspalum conjugatum.
2053. Panicum barbinode.
2068. Eragrostis ciliaris.
2072. Jouvea pilosa.
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2319. Bouteloua repens.
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7291. Echinochloa crusgalli crus-pavonis.
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7299. Leptochloa filiformis.
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7412. Panicum olivaceum.
7414. Andropogon saccharoides laguroides.
7424. Axonopus blakei.
7436. Panicum olivaceum.
7437. Panicum aciculare.
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[7]American grasses from the United States National Herbarium, Smithsonian Institution, distributed by the Systematic Agrostologist, United States Department of Agriculture.

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7445. Paspalum pectinatum.
7456. Panicum olivaceum.
7457. Panicum olivaceum.
7458. Panicum arenicoloides.
7462. Panicum sellowii.
7512. Panicum pulchellum.
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7572. Trachypogon montufari.
7573. Trachypogon montufari.
7579. Trachypogon montufari.
7584. Setaria geniculata.
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7610. Andropogon leucostachyus.
7611. Axonopus blakei.
7612. Paspalum pulchellum.
7613. Trachypogon montufari.
7615. Leptocoryphium lanatum.
7624. Eriochrysis cayennensis.
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7628. Andropogon glomeratus.
7629. Panicum maximum.
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7631. Homolepis aturensis.
7652. Ischaemum latifolium.
7658. Axonopus blakei.
7666. Paspalum pulchellum.
7674. Paspalum conjugatum.
7702. Paspalum paniculatum.
7703. Panicum laxum.
7704. Digitaria sanguinalis.
7705. Digitaria horizontalis.
7706. Paspalum conjugatum.
7711. Panicum pilosum.
7721. Lasiacis sorghoidea.
7736. Arundinella deppeana.
7739. Panicum olivaceum.
7742. Thrasya campylostachya.
7744. Paspalum minus.
7745. Eragrostis maypurensis.
7746. Paspalum plicatulum.
7747. Andropogon condensatus.
7748. Axonopus purpusii.
7749. Panicum stenodes.
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BLAKE, S. F.—Continued

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7762. Panicum olivaceum.
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7767. Axonopus purpusii.
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7813. Ichnanthus pallens.
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7817. Panicum olivaceum.
7824. Panicum polygonatum.
7829. Cynodon dactylon.
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7833. Paspalum vaginatum.
7834. Paspalum decumbens.
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29. Eleusine indica.
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491. Olyra latifolia.
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495. Eragrostis amabilis.
496. Eragrostis ciliaris.
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498. Cynodon dactylon.
499. Andropogon condensatus.
500. Sporobolus elongatus.
502. Arundinella deppeana.
503. Pennisetum complanatum.
504. Diectomis fastigiata.
505. Oplismenus burmanni.
506. Andropogon brevifolius.
507. Lasiacis oaxacensis.
508. Lasiacis divaricata.
509. Lasiacis sorghoidea.

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511. Sorghum vulgare.
512. Sorghum vulgare.
513. Chusquea simpliciflora.
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542. Phalaris arundinacea picta.
645. Paspalum paniculatum.
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648. Chloris gayana.
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716. Bambusa vulgaris.
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798. Panicum sonorum.
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1054. Aristida implexa.
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1323. Coix lacryma-jobi.
1324. Lasiacis oaxacensis.
1325. Chloris gayana.
1326. Trachypogon plumosus.
1327. Trachypogon montufari mollis.
1332. Tripsacum laxum.
1333. Paspalum paniculatum.
1334. Bouteloua alamosana.
1347. Cenchrus echinatus.
1363. Chusquea serrulata.
1372. Arthrostylidium racemiflorum.
1374. Coix lacryma-jobi.
1375. Chusquea simpliciflora.
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1769. Setaria longipila.
1770. Vetiveria zizanioides.
1774. Paspalum langei.
1795. Panicum fasciculatum.
1808. Panicum schiffneri.
1875. Panicum barbinode.
1876. Hymenachne amplexicaulis.
1877. Aristida arizonica.
1879. Paspalum repens.
1880. Panicum polygonatum.
1881. Paspalum fasciculatum.
1882. Ixophorus unisetus.
1883. Tripsacum laxum.
1884. Hyparrhenia rufa.
1898. Eragrostis maypurensis.
1900. Eragrostis viscosa.
1902. Pereilema crinitum.
1907. Lasiacis ruscifolia.
1909. Pennisetum ciliare.
1924. Gymnopogon aristiglumis.
1925. Pennisetum ciliare.
1927. Aristida jorullensis .
1931. Eragrostis maypurensis.
1946. Panicum laxum.

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2014. Setaria tenacissima.
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2029. Diectomis fastigiata.
2043. Panicum barbinode.
2046. Pennisetum purpureum.
2049. Aristida jorullensis.
2051. Ichnanthus pallens.
2059. Eragrostis viscosa.
2063. Setaria paniculifera.
2064. Sorghum vulgare.
2072. Gymnopogon aristiglumis.
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130. Panicum trichoides.
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191. Panicum trichoides.
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220. Eragrostis ciliaris.
445. Olyra latifolia.
499. Pharus latifolius.
528. Stenotaphrum secundatum.
565. Digitaria horizontalis.
570. Pseudechinolaena polystachya.
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21. Eragrostis amabilis.
22. Chloris inflata.
23. Digitaria sanguinalis.
25. Eleusine indica.
27. Cenchrus echinatus.
47. Lasiacis ruscifolia.
63. Lasiacis sorghoidea.
78. Eleusine indica.
81. Andropogon condensatus.
83. Oplismenus burmanni.
84. Panicum trichoides.
87. Setaria tenax.

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04. Setaria geniculata.
05. Paspalum conjugatum.
06. Paspalum paniculatum.
07. Axonopus compressus.
08. Panicum polygonatum.
09. Setaria paniculifera.
010. Digitaria horizontalis.
011. Ichnanthus pallens.
012. Andropogon bicornis.

COOK, O. F., AND ASSISTANTS.

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58. Axonopus polophyllus.
60. Epicampes emersleyi.
82. Hackelochloa granularis.
116. Olyra yucatana.
119. Lasiacis procerrima.
138. Lasiacis divaricata.
225. Oplismenus hirtellus.
284. Panicum pulchellum.
289. Thrasya campylostachya.
296. Digitaria horizontalis.
306. Arundinella deppeana.
324. Paspalum conjugatum.
338. Isachne arundinacea.
431. Paspalum orbiculatum.
446. Eragrostis hypnoides.
462. Paspalum conjugatum pubescens.

COOK, O. F., AND ASSISTANTS—Con.

499. Panicum pilosum.
530. Panicum polygonatum.
579. Panicum maximum.
659. Setaria geniculata.
660. Digitaria horizontalis.
684. Sorghum halepense.
691. Arundinella berteroniana.
725. Arthrostylidium racemiflorum.

COOPER, J. J.[6]

63. Chloris orthonoton.
64. Muhlenbergia implicata.
75. Paspalum candidum.
144. Echinochloa crusgalli crus-pavonis.
156. Setaria geniculata.
168. Oplismenus hirtellus.
5991. Ichnanthus pallens.
5992. Echinochloa crusgalli crus-pavonis.
5993. Setaria geniculata.
5994. Oplismenus hirtellus.
5995. Paspalum candidum.
5996. Muhlenbergia implicata.
5997. Chloris orthonoton.
5998. Lasiacis sorghoidea.

DEAM, C. C.

80. Paspalum paniculatum.
86. Andropogon brevifolius.
419. Trichachne insularis.
420. Eragrostis ciliaris.
422. Setaria geniculata.
424. Panicum trichanthum.
6038. Paspalum orbiculatum.
6041. Panicum trichoides.
6078. Arthrostylidium pittieri.
6087. Trichachne insularis.
6132. Bouteloua filiformis.
6133. Aristida ternipes.
6138. Leersia hexandra.
6143. Panicum molle.
6158. Aegopogon cenchroides.
6168. Setaria geniculata.
6205. Paspalum notatum.
6267. Panicum fasciculatum.
6268. Panicum maximum.
6322. Echinochloa colonum.

[6] In part distributed by J. Donnell Smith.

FENDLER, A.

362. Stenotaphrum secundatum.
363. Oplismenus burmanni.
365. Echinochloa crusgalli crus-pavonis.
367. Dactyloctenium aegyptium.
368. Panicum pilosum.
370. Homolepis aturensis.
371. Lasiacis sorghoidea.
373. Ichnanthus tenuis.
380. Orthoclada laxa.
381. Guadua aculeata.

GAUMER, G. F.

72. Digitaria horizontalis.
100. Digitaria horizontalis.
101. Eleusine indica.
115. Setaria geniculata.
136. Oplismenus hirtellus.

GOLL, G. P.

11. Panicum pilosum.
24. Lasiacis divaricata.
35A. Panicum elephantipes.
36A. Hymenachne amplexicaulis.
43. Lasiacis procerrima.
44. Tripsacum latifolium.
45. Homolepis aturensis.
78. Paspalum microstachyum.
79. Paspalum paniculatum.
80. Setaria scandens.
Paspalum botterii.
81. Panicum fasciculatum.
Paspalum plicatulum.
96. Oplismenus hirtellus.
178. Ichnanthus pallens.
256. Arundinella deppeana.
258. Andropogon condensatus.

HART, J.

65. Paspalum paniculatum.
66. Chloris radiata.
67. Leptochloa virgata.
69. Ichnanthus pallens.
71. Orthoclada laxa.
72. Ichnanthus pallens.
73. Panicum polygonatum.
74. Oplismenus burmanni.
76. Leptochloa virgata.
77. Pharus latifolius.
78. Panicum fasciculatum.

HART, J.—Continued

81. Paspalum conjugatum pubescens.
83. Oplismenus hirtellus.
86. Panicum laxum.
87. Panicum trichanthum.
88. Paspalum paniculatum.
89. Ichnanthus pallens.
91. Eragrostis tephrosanthos.
92. Paspalum orbiculatum.
93. Eleusine indica.
180. Paspalum decumbens.
183. Stenotaphrum secundatum.

HERB. INST. FIS.-GEOGR. COSTARIC*

15. Paspalum decumbens.
33. Muhlenbergia tenella.
81. Lasiacis sorghoidea.
98. Lasiacis sorghoidea.
196. Agrostis tolucensis.
220. Paspalum fasciculatum.
224. Eleusine indica.
230. Poa annua.
253. Axonopus compressus.
267. Paspalum paniculatum.
306. Paspalum distichum.
Paspalum notatum.
334. Agrostis pittieri.
362. Paspalum microstachyum.
380. Digitaria sanguinalis.
382. Echinochloa crusgalli crus-pavonis.
383. Sorghum vulgare.
413. Hymenachne amplexicaulis.
461. Setaria geniculata.
470. Setaria paniculifera.
507. Paspalum clavuliferum.
508. Axonopus capillaris.
509. Digitaria sanguinalis.
511. Sporobolus ciliatus.
513. Aristida jorullensis.
544. Muhlenbergia tenella.
571. Lasiacis sorghoidea.
585. Arundinella berteroniana.
646. Setaria geniculata.
721b. Eleusine indica.
731. Oplismenus burmanni.
752. Paspalum notatum.
758. Paspalum conjugatum.

HERB. INST. FIS.-GEOGR. COSTARIC—Con.

765. Setaria geniculata.
766. Sporobolus elongatus.
767. Eleusine indica.
769. Chloris orthonoton.
770. Eragrostis limbata.
771. Eragrostis ciliaris.
775. Muhlenbergia tenella.
786. Muhlenbergia diversiglumis.
787. Polypogon elongatus.
855. Agrostis turrialbae.
1119. Eragrostis tephrosanthos.
1137. Cenchrus viridis.
1182. Panicum polygonatum.
1183. Panicum polygonatum.
Paspalum orbiculatum.
1244. Panicum viscidellum.
1294. Chloris orthonoton.
1295. Eragrostis ciliaris.
1346. Ichnanthus nemorosus.
1380. Eragrostis limbata.
1383. Leersia hexandra.
1480. Leersia hexandra.
1481. Oplismenus burmanni.
1482. Panicum pulchellum.
1612. Oplismenus burmanni.
1613. Aristida capillacea.
1614. Pennisetum setosum.
1615. Lasiacis divaricata.
1616. Lasiacis rhizophora.
1617. Zeugites pittieri.
1618. Oplismenus hirtellus.
1678. Oplismenus burmanni.
1692. Muhlenbergia diversiglumis.
1759. Pereilema crinitum.
1811. Oplismenus burmanni.
1971. Leptocoryphium lanatum.
2034. Panicum maximum.
2035. Panicum fasciculatum.
Hackelochloa granularis.
2195. Arundinella deppeana.
2246. Euchlaena mexicana.
2247. Lasiacis scabrior.
2248. Polypogon elongatus.
2249. Chusquea pittieri.
2335. Sporobolus elongatus.
2336. Eleusine indica.
2337. Andropogon bicornis.
2406. Lasiacis sorghoidea.
2407. Arundinella berteroniana.
2408. Zeugites mexicana.
2409. Paspalum plenum.

* Including distributions from Costa Rica by Pittier, Tonduz, and others.

HERB. INST. FIS.-GEOGR. COSTARIC—Con.

2410. Axonopus scoparius.
2411. Digitaria sanguinalis.
2475. Sporobolus elongatus.
2476. Chloris orthonoton.
2477. Eragrostis hypnoides.
2478. Eragrostis ciliaris.
2479. Panicum polygonatum.
2594. Digitaria horizontalis.
2596. Eleusine indica.
2598. Panicum zizanioides.
2599. Arundinella deppeana.
2600. Leptochloa virgata.
2601. Paspalum conjugatum.
2602. Eleusine indica.
2603. Digitaria sanguinalis.
2604. Leptochloa scabra.
2605. Gynerium sagittatum.
2606. Setaria geniculata.
2632. Eleusine indica.
2633. Panicum ghiesbreghtii.
2634. Leptochloa virgata.
2635. Digitaria horizontalis.
2677. Eragrostis hypnoides.
2684. Leptochloa filiformis.
2688. Uniola pittieri.
2690. Paspalum virgatum.
2691. Axonopus purpusii.
2694. Trachypogon montufari.
2699. Leptochloa filiformis.
Leptochloa virgata.
2700. Setaria geniculata.
2702. Dactyloctenium aegyptium.
2703. Eleusine indica.
2704. Echinochloa colonum.
2828. Axonopus compressus.
2829. Eragrostis tephrosanthos.
2830. Echinochloa colonum.
2851. Paspalum squamulatum.
2854. Eragrostis tephrosanthos.
2856. Leptochloa virgata.
2857. Cenchrus viridis.
2858. Panicum hirticaule.
2859. Eragrostis tephrosanthos.
2860. Paspalum conjugatum.
2862. Eragrostis ciliaris.
2863. Axonopus compressus.
2932. Eragrostis limbata.
2933. Eragrostis tephrosanthos.
2934. Eragrostis limbata.
2935. Eragrostis ciliaris.
2936. Chaetium bromoides.

HERB. INST. FIS.-GEOGR. COSTARIC—Con.

2937. Chloris orthonoton.
2954. Trisetum viride.
2966. Setaria geniculata.
2985. Agrostis pittieri.
2995. Panicum maximum.
2996. Paspalum virgatum.
2997. Setaria geniculata.
2998. Brachiaria plantaginea.
2999. Chloris radiata.
3008. Setaria geniculata.
3009. Paspalum conjugatum.
3015. Muhlenbergia tenella.
3016. Echinochloa crusgalli crus-pavonis.
3017. Paspalum costaricense.
Paspalum convexum.
3029. Brachiaria plantaginea.
3071. Panicum laxum.
3076. Lasiacis sorghoidea.
3106. Lasiacis sorghoidea.
3107. Panicum polygonatum.
3108. Paspalum orbiculatum.
3109. Paspalum conjugatum.
3110. Digitaria sanguinalis.
3111. Panicum trichoides.
3112. Ichnanthus axillaris.
3113. Oplismenus burmanni.
3114. Lasiacis sorghoidea.
3115. Oplismenus hirtellus.
3116. Pseudechinolaena polystachya.
3117. Panicum laxum.
3118. Panicum glutinosum.
3120. Oplismenus burmanni.
3121. Pereilema crinitum.
3122. Setaria tenacissima.
3123. Panicum trichoides.
3124. Oplismenus burmanni.
3131. Pereilema crinitum.
3224. Trichachne insularis.
3230. Arundinella deppeana.
3245. Lasiacis scabrior.
3269. Ichnanthus pallens.
3275. Paspalum plicatulum.
3287. Pennisetum setosum.
3305. Axonopus aureus.
3328. Zeugites pittieri.
3329. Pereilema crinitum.
3330. Oplismenus burmanni.
3331. Andropogon leucostachyus.
3332. Lasiacis sorghoidea.
3333. Diectomis fastigiata.

HERB. INST. FIS.-GEOGR. COSTARIC—CON.

3334. Aristida jorullensis.
3335. Thrasya hitchcockii.
3356. Eragrostis ciliaris.
3359. Calamagrostis pittieri.
3360. Axonopus compressus.
3361. Digitaria sanguinalis.
3362. Panicum pulchellum.
3363. Ichnanthus tenuis.
3364. Paspalum conjugatum.
3365. Lasiacis scabrior.
3366. Lasiacis sorghoidea.
3367. Chusquea subtessellata.
3368. Agrostis tolucensis.
3370. Cinna poaeformis.
3373. Agrostis tolucensis.
3374. Calamagrostis intermedia.
3375. Paspalum decumbens.
Paspalum nutans.
3532. Avena sterilis.
3583. Panicum stenodoides.
3615. Ichnanthus tenuis.
3616. Ichnanthus pallens.
3617. Leptochloa virgata.
3618. Digitaria sanguinalis.
3619. Panicum altum.
3620. Uniola pittieri.
3621. Eragrostis tephrosanthos.
3622. Panicum laxum.
3623. Eragrostis ciliaris.
3624. Hymenachne amplexicaulis.
3625. Eleusine indica.
3626. Gynerium sagittatum.
3628. Panicum haenkeanum.
3629. Aristida capillacea.
3630. Andropogon leucostachyus.
3631. Panicum parvifolium.
3632. Leptocoryphium lanatum.
3633. Ichnanthus pallens.
3634. Panicum hirsutum.
3635. Aristida capillacea.
3636. Panicum haenkeanum.
3638. Lasiacis sorghoidea.
3639. Olyra caudata.
3640. Panicum haenkeanum.
3641. Olyra lateralis.
3645. Orthoclada laxa.
3646. Lasiacis scabrior.
3647. Ichnanthus tenuis.
3649. Paspalum decumbens.
3650. Panicum polygonatum.
3651. Panicum trichoides.

HERB. INST. FIS.-GEOGR. COSTARIC—CON.

3652. Oplismenus hirtellus.
3653. Oplismenus burmanni.
3654. Ichnanthus tenuis.
3655. Panicum cordovense.
Paspalum decumbens.
3656. Panicum pulchellum.
3657. Panicum laxum.
3658. Paspalum minus.
3659. Panicum parvifolium.
3660. Eragrostis maypurensis.
3661. Panicum haenkeanum.
3662. Arundinella deppeana.
3663. Andropogon virgatus.
3665. Arundinella confinis.
3666. Eriochloa distachya.
3669. Axonopus aureus.
3670. Hyparrhenia bractesta.
3672. Arundinella confinis.
3673. Panicum haenkeanum.
3675. Gymnopogon fastigiatus.
3679. Panicum rudgei.
3680. Aristida torta.
3681. Andropogon semiberbis.
3682. Andropogon virgatus.
3683. Axonopus aureus.
3684. Homolepis aturensis.
3685. Panicum cayennense.
3686. Paspalum decumbens.
3687. Panicum haenkeanum.
3689. Pereilema crinitum.
3690. Aristida capillacea.
3691. Digitaria sanguinalis.
3844. Eragrostis maypurensis.
4042. Panicum polygonatum.
4090. Panicum barbinode.
4091. Digitaria horizontalis.
4092. Panicum polygonatum.
4093. Setaria geniculata.
4094. Pseudechinolaena polystachya.
4194. Digitaria sanguinalis.
4197. Paspalum paniculatum.
4198. Dactyloctenium aegyptium.
4199. Leptochloa scabra.
4200. Eleusine indica.
4201. Eleusine indica.
4202. Cenchrus echinatus.
4203. Digitaria sanguinalis.
Digitaria horizontalis.
4204. Cynodon dactylon.
4205. Setaria geniculata.
4209. Spartina spartinae.

HERB. INST. FIS.-GEOGR. COSTARIC—Con.

4211. Brachypodium mexicanum.
4212. Poa annua.
4325. Paspalum notatum.
4326. Panicum virgultorum.
4328. Lasiacis sorghoidea.
4329. Paspalum distichum.
4331. Digitaria sanguinalis.
4449. Sporobolus ciliatus.
4450. Pereilema crinitum.
4451. Aristida capillacea.
4452. Eragrostis maypurensis.
4453. Trachypogon montufari.
4454. Eriochloa distachya.
4455. Lasiacis sorghoidea.
4456. Andropogon brevifolius.
4457. Pennisetum setosum.
4458. Panicum trichoides.
4459. Panicum pulchellum.
4460. Ichnanthus tenuis.
4460b. Panicum polygonatum.
4461. Hackelochloa granularis.
4462. Aristida torta.
4464. Axonopus chrysoblepharis.
4465. Oplismenus hirtellus.
4466. Oplismenus burmanni.
4467. Trachypogon montufari.
4468. Hyparrhenia bracteata.
4470. Paspalum multicaule.
4471. Paspalum minus.
4472. Paspalum plicatulum.
4473. Panicum laxum.
4474. Paspalum multicaule.
Paspalum pictum.
4621. Isachne arundinacea.
4622. Eriochloa distachya.
4623. Isachne polygonoides.
4624. Hyparrhenia bracteata.
4625. Andropogon brevifolius.
4626. Panicum haenkeanum.
4627. Pereilema crinitum.
4628. Orthoclada laxa.
4629. Sorghastrum incompletum.
4630. Andropogon brevifolius.
Epicampes emersleyi (Dist. Pittier and Durand).
4631. Aristida capillacea.
4632. Oplismenus hirtellus.
4638. Axonopus chrysoblepharis.
4794. Sorghastrum incompletum.
4795. Andropogon bicornis.
4820. Olyra latifolia.

HERB. INST. FIS.-GEOGR. COSTARIC—Con.

4858. Lasiacis sorghoidea.
4859. Olyra latifolia.
4860. Panicum haenkeanum.
4861. Orthoclada laxa.
4862. Paspalum conjugatum.
4863. Paspalum plicatulum.
4864. Panicum laxum.
4865. Panicum trichoides.
4867. Arundinella berteroniana.
4868. Panicum laxum.
4869. Eragrostis maypurensis.
4869b. Paspalum multicaule.
4870. Axonopus compressus.
4871. Panicum laxum.
4872. Ischaemum latifolium.
4873. Andropogon virgatus.
4874. Isachne polygonoides.
4875. Panicum rudgei.
4876. Homolepis aturensis.
4877. Oplismenus hirtellus.
4879. Aristida torta.
4880. Paspalum decumbens.
4881. Panicum pulchellum.
5316. Panicum haenkeanum.
5317. Panicum haenkeanum.
6540. Lasiacis scabrior.
6541. Andropogon leucostachyus.
6543. Leptocoryphium lanatum.
6545. Pseudechinolaena polystachya.
6546. Andropogon leucostachyus.
6547. Panicum glutinosum.
6548. Paspalum lineare.
6825. Setaria magna.
6826. Uniola pittieri.
6898. Leersia hexandra.
6907. Paspalum saccharoides.
6943. Brachiaria plantaginea.
6945. Trichachne pittieri.
6946. Paspalum paniculatum.
6982. Paspalum convexum.
6983. Chaetium bromoides.
6984. Digitaria sanguinalis.
6985. Setaria geniculata.
7001. Panicum pulchellum.
7002. Oplismenus burmanni.
7003. Eragrostis ciliaris.
7004. Eleusine indica.
7005. Pharus latifolius.
7109. Chloris orthonoton.
7110. Lasiacis sorghoidea.
7147. Paspalum fasciculatum.

HERB. INST. FIS.-GEOGR. COSTARIC—CON.

7148. Leersia hexandra.
7193. Arthrostylidium pittieri.
7207. Lasiacis sorghoidea.
7225. Paspalum fasciculatum.
7233. Oplismenus burmanni.
7234. Lasiacis sorghoidea.
Lasiacis scabrior.
7276. Oplismenus burmanni.
7348. Axonopus aureus.
7354. Paspalum conjugatum.
7355. Epicampes emersleyi.
7356. Hyparrhenia bracteata.
7358. Epicampes emersleyi.
7359. Lasiacis scabrior.
7360. Panicum pulchellum.
7361. Ichnanthus pallens.
7462. Oryza latifolia.
7463. Panicum pilosum.
7465. Lasiacis scabrior.
7466. Orthoclada laxa.
7467. Panicum hirsutum.
7468. Setaria paniculifera.
7469. Arundinella berteroniana.
7470. Paspalum conjugatum.
7471. Panicum fasciculatum.
7472. Digitaria horizontalis.
7530. Echinochloa crusgalli crus-pavonis.
7542. Panicum polygonatum.
7560. Chusquea virgata.
7564. Ichnanthus pallens.
7592. Brachiaria plantaginea.
7625. Paspalum virgatum.
7641. Olyra latifolia.
7730. Chusquea virgata.
7878. Panicum sphaerocarpon.
7895. Panicum trichanthum.
8020. Pennisetum distachyum.
8038. Paspalum costaricense.
8186. Lasiacis sorghoidea.
8187. Panicum polygonatum.
8229. Oplismenus burmanni.
8233. Isachne polygonoides.
8243. Leersia hexandra.
8244. Panicum polygonatum.
8254. Pseudechinolaena polystachya.
8267. Panicum laxum.
8291. Olyra latiolia.
8315. Leersia hexandra.
8319. Lasiacis sloanei.
8395. Digitaria sanguinalis.

HERB. INST. FIS.-GEOGR. COSTARIC—CON.

8401. Panicum barbinode.
8448. Panicum parviglume.
8458. Oplismenus burmanni.
8492. Paspalum candidum.
8527. Lasiacis scabrior.
8557. Panicum polygonatum.
8566. Panicum zizanioides.
8600. Panicum trichanthum.
8601. Orthoclada laxa.
8636. Ichnanthus pallens.
8637. Oplismenus burmanni.
8670. Panicum trichanthum.
8672. Eragrostis ciliaris.
8691. Paspalum virgatum.
8693. Eriochloa punctata.
8708. Eragrostis ciliaris.
8716. Digitaria horizontalis.
8725. Arundinella berteroniana.
8741. Cenchrus viridis.
8745. Eleusine indica.
8817. Setaria geniculata.
8818. Pennisetum virgultorum.
8819. Lasiacis procerrima.
8820. Arundinella deppeana.
8821. Paspalum paniculatum.
8822. Paspalum distichum.
8823. Sporobolus elongatus.
8824. Paspalum notatum.
8825. Echinochloa crusgalli crus-pavonis.
8826. Leersia grandiflora.
8827. Echinochloa colonum.
8828. Paspalum conjugatum.
8829. Panicum virgultorum.
8831. Gynerium sagittatum.
9009. Setaria paniculifera.
9015. Pseudechinolaena polystachya.
9036. Paspalum convexum.
9037. Setaria viridis.
9038. Digitaria sanguinalis.
9039. Axonopus compressus.
9048. Axonopus compressus.
9049. Paspalum convexum.
9050. Panicum maximum.
9051. Chloris orthonoton.
9055. Paspalum pilosum.
9056. Lasiacis sloanei.
9063. Dactyloctenium aegyptium.
9068. Muhlenbergia diversiglumis.
9080. Panicum parviglume.
9084. Muhlenbergia diversiglumis.

HERB. INST. FIS.-GEOGR. COSTARIC—Con.

9086. Muhlenbergia tenella.
9114. Panicum maximum.
9115. Uniola pittieri.
9116. Eragrostis ciliaris.
9117. Anthephora hermaphrodita.
9118. Chloris petraea.
9119. Digitaria horizontalis.
9120. Cenchrus echinatus.
9121. Cenchrus tribuloides.
9207. Pharus parvifolius.
9208. Oryza latifolia.
9209. Olyra latifolia.
9210. Orthoclada laxa.
9211. Arundinella deppeana.
9213. Lasiacis scabrior.
9214. Arundinella berteroniana.
9215. Setaria geniculata.
9374. Coix lacryma-jobi.
9395. Paspalum dilatatum.
9401. Streptochaeta sodiroana.
9492. Lasiacis scabrior.
9493. Lasiacis sorghoidea.
9494. Olyra latifolia.
9495. Panicum pilosum.
9497. Arundinella berteroniana.
9552. Pharus cornutus.
9722. Sorghum halepense.
9727. Panicum fasciculatum.
9734. Paspalum humboldtianum.
9754. Panicum trichoides.
9755. Paspalum microstachyum.
9817. Pereilema crinitum.
9818. Lasiacis oaxacensis.
9841. Oplismenus burmanni.
9851. Eragrostis simpliciflora.
9854. Paspalum candidum.
9939. Oplismenus burmanni.
10025. Eragrostis ciliaris.
10026. Eragrostis tephrosanthos.
10028. Eleusine indica.
10082. Olyra latifolia.
10099. Panicum polygonatum.
10306. Imperata contracta.
10307. Panicum zizanioides.
10352. Raddia costaricensis.
10372. Bouteloua chondrosioides.
10374. Bouteloua pilosa.
10375. Aristida jorullensis.
10377. Eragrostis maypurensis.
10378. Oplismenus burmanni.
10379. Panicum trichoides.

HERB. INST. FIS.-GEOGR. COSTARIC—Con.

10380. Leptochloa filiformis.
10423. Lasiacis sorghoidea.
10456. Cinna poaeformis.
10470. Agrostis hoffmanni.
10476. Calamagrostis pittieri.
10477. Agrostis bacillata.
10526. Arundinaria viscosa.
10558. Oryza latifolia.
10573. Pennisetum bambusiforme.
10576. Panicum rudgei.
10588. Panicum rudgei.
10589. Panicum stenodes.
10591. Ichnanthus pallens.
10594. Panicum parvifolium.
10602. Streptogyne crinita.
10615. Panicum sellowii.
10639. Arundinella berteroniana.
10651. Isachne arundinacea.
10663. Orthoclada laxa.
10745. Panicum sphaerocarpon.
Panicum olivaceum.
10746. Poa annua.
10747. Chusquea serrulata.
10748. Lolium perenne.
10749. Trisetum viride.
10750. Agrostis tolucensis.
10751. Axonopus compressus.
10752. Setaria geniculata.
10753. Sporobolus elongatus.
10754. Echinochloa crusgalli crus-pavonis.
10755. Chusquea tonduzii.
10871. Lasiacis sorghoidea.
10946. Lasiacis scabrior.
11003. Axonopus aureus.
11004. Axonopus aureus.
11005. Arundinella confinis.
11006. Setaria tenacissima.
11007. Eriochrysis cayennensis.
11008. Olyra lateralis.
11009. Isachne arundinacea.
11010. Andropogon leucostachyus.
11011. Lasiacis procerrima.
11012. Thrasya campylostachya.
11013. Sporobolus cubensis.
11014. Leptocoryphium lanatum.
11015. Lasiacis sorghoidea.
11016. Setaria geniculata.
11017. Panicum glutinosum.
11018. Thrasya campylostachya.
11019. Epicampes emersleyi.

HERB. INST. FIS.-GEOGR. COSTARIC—Con.

11021. Rottboellia aurita.
11110. Sorghum halepensis.
11246. Arundinella berteroniana.
11276. Panicum zizanioides.
11392. Pseudechinolaena polystachya.
11393. Panicum barbinode.
11394. Setaria paniculifera.
11395. Paspalum distichum.
11396. Panicum polygonatum.
11397. Lasiacis sorghoidea.
11398. Digitaria horizontalis.
11399. Eleusine indica.
11400. Setaria geniculata.
11401. Digitaria sanguinalis.
11402. Paspalum conjugatum.
11627. Polypogon elongatus.
11729. Arundinaria viscosa.
11767. Paspalum tonduzii.
Paspalum costaricense.
11770. Chaetium bromoides.
11793. Arundinaria viscosa.
11866. Panicum sphaerocarpon.
11889. Ichnanthus nemorosus.
11920. Polypogon elongatus.
11992. Stenotaphrum secundatum.
11996. Dactyloctenium aegyptium.
12002. Panicum glutinosum.
12057. Lasiacis procerrima.
12058. Olyra lateralis.
12064. Panicum rudgei.
12210. Poa annua.
12272. Oplismenus hirtellus.
12277. Polypogon elongatus.
12386. Paspalum virgatum.
12509. Ichnanthus nemorosus.
12515. Ichnanthus nemorosus.
12567. Isachne arundinacea.
12623. Paspalum squamulatum.
12671. Axonopus compressus.
12697. Paspalum vaginatum.
12698. Sporobolus littoralis.
12727. Leersia grandiflora.
12798. Isachne arundinacea.
12806. Pseudechinolaena polystachya.
12858. Lasiacis ruscifolia.
12970. Isachne arundinacea.
12992. Paspalum decumbens.
13082. Trisetum viride.
13237. Trisetum viride.
13326. Setaria geniculata.
13327. Eragrostis hypnoides.

HERB. INST. FIS.-GEOGR. COSTARIC—Con.

13405. Olyra latifolia.
13745. Bouteloua repens.
13746. Eragrostis maypurensis.
13747. Diectomis fastigiata.
13748. Lasiacis divaricata.
13749. Panicum fasciculatum.
13750. Aristida jorullensis.
13751. Pennisetum setosum.
13752. Andropogon brevifolius.
13752b. Aristida jorullensis.
13753. Sorghastrum incompletum.
13754. Panicum trichoides.
13755. Lasiacis sorghoidea.
13756. Aristida ternipes.
13757. Bouteloua pilosa.
13758. Oplismenus burmanni.
13759. Olyra latifolia.
Lasiacis ruscifolia.
13760. Cenchrus viridis.
14063. Arthrostylidium maxoni.
14064. Pennisetum distachyum.
14126. Chusquea lehmannii.
14127. Triniochloa stipoides.
14128. Cinna poaeformis.
14129. Agrostis tolucensis.
14130. Cortaderia nitida.
14337. Paspalum notatum.
14375. Lasiacis sorghoidea.
14376. Digitaria sanguinalis.
14480. Ixophorus unisetus.
16050. Pharus cornutus.
16081. Panicum trichoides.
16115. Sporobolus elongatus.
16118. Paspalum fasciculatum.
16119. Paspalum costaricense.
16120. Paspalum notatum.
16121. Axonopus compressus.
16122. Leersia hexandra.
16123. Panicum laxum.
16124. Brachiaria plantaginea.
16171. Setaria vulpiseta.
16174. Tripsacum laxum.
16266. Eleusine indica.
16268. Digitaria sanguinalis.
16269. Paspalum decumbens.
16662. Panicum maximum.
16734. Paspalum conjugatum pubescens.
16735. Eleusine indica.
16736. Eragrostis tephrosanthos.
16737. Chloris radiata.

HERB. INST. FIS.-GEOGR. COSTARIO—Con.

16738. Oplismenus burmanni.
16739. Cenchrus viridis.
16962. Panicum laxum.
17166. Agrostis tolucensis.
17168. Sporobolus ciliatus.
17294. Setaria paniculifera.
17326. Pharus glaber.
17377. Tricholaena rosea.
17378. Tricholaena rosea.
17379. Arundinella confinis.
17380. Setaria geniculata.
17381. Oplismenus burmanni.
17382. Pennisetum setosum.
17383. Lasiacis ruscifolia.
17555. Setaria scandens.
17556. Perellema crinitum.
17557. Muhlenbergia ciliata.
17908. Lasiacis sorghoidea.
17909. Isachne polygonoides.
17910. Pennisetum distachyum.
17912. Eragrostis tephrosanthos.
17913. Digitaria sanguinalis.
17916. Arundinella deppeana.
17919. Polypogon elongatus.

HERIBERTO

4. Lasiacis sorghoidea.
14. Orthoclada laxa.
56. Setaria geniculata.
66. Panicum polygonatum.
152. Isachne polygonoides.
192. Paspalum microstachyum.
194. Olyra latifolia.
257. Lasiacis sorghoidea.

HEYDE

237. Oplismenus hirtellus.
362. Lasiacis sorghoidea.
648. Oplismenus burmanni.
734. Paspalum notatum.

HEYDE & LUX

3556. Brachiaria plantaginea.
3557. Eragrostis limbata.
3558. Paspalum paniculatum.
3559. Microchloa indica.
3560. Pentarrhaphis scabra.
3561. Eleusine indica.
3562. Digitaria sanguinalis.
3563. Eragrostis limbata.
3564. Eriochrysis cayennensis.

HEYDE & LUX—Continued

3565. Eragrostis limbata.
3566. Chusquea heydei.
3898. Paspalum virgatum.
3899. Lasiacis ruscifolia.
3900. Panicum laxum.
3901. Eragrostis ciliaris.
3902. Paspalum conjugatum.
3903. Paspalum scabrum.
3905. Andropogon saccharoides.
3906. Lasiacis procerrima.
3907. Arundinella deppeana.
3908. Eragrostis viscosa.
3909. Setaria geniculata.
3910. Paspalum notatum.
3911. Echinochloa holciformis.
3912. Anthephora hermaphrodita.
3913. Muhlenbergia tenella.
3914. Pereilema crinitum.
3915. Lasiacis rhizophora.
3916. Isachne polygonoides.
3917. Sporobolus elongatus.
3918. Chloris virgata.
3919. Hackelochloa granularis.
3920. Trachypogon montufari.
3921. Pereilema crinitum.
3922. Oplismenus hirtellus.
3923. Pennisetum complanatum.
3924. Chaetium bromoides.
3925. Sporobolus macrospermus.
3926. Eleusine indica.
3927. Panicum sellowii.
3928. Eragrostis cilianensis.
3929. Sorghastrum incompletum.
3930. Bouteloua curtipendula.
3931. Hyparrhenia ruprechtii.
3932. Epicampes stricta.
4101. Paspalum plicatulum.
4295. Setaria tenacissima.
4296. Cenchrus viridis.
4297. Oplismenus burmanni.
4298. Paspalum cymbiforme.
4299. Panicum trichoides.
4300. Paspalum candidum.
4302. Arthrostylidium pittieri.
4303. Eragrostis cilianensis.
4658. Arundinella deppeana.
4659. Pentarrhaphis scabra.
6267. Leersia hexandra.
6268. Trichachne insularis.
6269. Chaetium bromoides.
6270. Eragrostis lugens.

HEYDE & LUX—Continued

6271. Paspalum humboldtianum.
6272. Leersia hexandra.
6273. Andropogon bicornis.
6274. Pereilema crinitum.
6275. Oplismenus setarius.
6276. Oplismenus burmanni.
6277. Anthephora hermaphrodita.
6278. Andropogon angustatus.
6279. Hyparrhenia bracteata.
6280. Arundinella deppeana.
6281. Bouteloua filiformis.
6400. Olyra latifolia.
6401. Ixophorus unisetus.
6402. Paspalum virgatum.
6403. Paspalum plicatulum.
6404. Panicum fasciculatum.

HITCHCOCK, A. S.

7893. Homolepis aturensis.
7894. Chloris radiata.
7895. Panicum trichanthum.
7896. Trichachne insularis.
7897. Panicum pilosum.
7898. Setaria vulpiseta.
7899. Paspalum fasciculatum.
7900. Panicum laxum.
7901. Dactyloctenium aegyptium.
7902. Paspalum plicatulum.
7903. Paspalum virgatum.
7904. Paspalum saccharoides.
7905. Oryza latifolia.
7906. Setaria vulpiseta.
7907. Paspalum paniculatum.
7908. Panicum fasciculatum.
7908½. Panicum fasciculatum.
7909. Paspalum conjugatum.
7910. Eleusine indica.
7911. Sporobolus indicus.
7912. Axonopus compressus.
7913. Axonopus compressus.
7914. Cenchrus viridis.
7915. Digitaria sanguinalis.
7916. Digitaria horizontalis.
7917. Coix lacryma-jobi.
7918. Leptochloa virgata.
7919. Olyra latifolia.
7920. Panicum maximum.
7920½. Hackelochloa granularis.
7921. Setaria geniculata.
7922. Echinochloa colonum.
7923. Cynodon dactylon.

HITCHCOCK, A. S.—Continued

7924. Chloris inflata.
7925. Eragrostis ciliaris.
7926. Setaria vulpiseta.
7927. Eragrostis tephrosanthos.
7928. Axonopus centralis.
7929. Hackelochloa granularis.
7930. Eragrostis acutiflora.
7931. Panicum barbinode.
7932. Panicum fasciculatum.
7933. Panicum trichoides.
7934. Imperata contracta.
7935. Setaria paniculifera.
7936. Andropogon leucostachyus.
7937. Andropogon glomeratus.
7938. Andropogon bicornis.
7939. Paspalum decumbens.
7940. Homolepis aturensis.
7941. Digitaria sanguinalis.
7942. Panicum milleflorum.
7943. Panicum polygonatum.
7944. Panicum megiston.
7945. Oryza latifolia.
7946. Gynerium sagittatum.
7947. Cynodon dactylon.
7948. Sorghum halepense.
7949. Cenchrus echinatus.
7950. Guadua aculeata.
7951. Oplismenus burmanni.
7952. Chusquea simpliciflora.
7953. Andropogon brevifolius.
7954. Sporobolus indicus.
7955. Lasiacis sorghoidea.
7956. Panicum geminatum.
7957. Panicum hirsutum.
7958. Echinochloa crusgalli crus-pavonis.
7959. Chusquea simpliciflora.
7960. Paspalum decumbens.
7961. Lasiacis procerrima.
7962. Paspalum decumbens.
7963. Homolepis aturensis.
7964. Panicum hirsutum.
7965. Panicum polygonatum.
7966. Paspalum orbiculatum.
7967. Leersia hexandra.
7968. Panicum laxum.
7969. Paspalum plicatulum.
7970. Andropogon condensatus.
7971. Andropogon virginicus.
7972. Andropogon virginicus.
7973. Paspalum minus.

HITCHCOCK, A. S.—Continued

7974. Panicum zizanioides.
7975. Eragrostis acutiflora.
7976. Axonopus ater.
7977. Panicum chloroticum.
7978. Paspalum minus.
7979. Sporobolus indicus.
7980. Panicum geminatum.
7981. Paspalum plicatulum.
7982. Andropogon bicornis.
7983. Olyra latifolia.
7984. Lasiacis procerrima.
7985. Paspalum centrale.
7986. Eragrostis acutiflora.
7987. Axonopus aureus.
7988. Paspalum pilosum.
7988a. Thrasya campylostachya.
7989. Andropogon leucostachyus.
7990. Paspalum decumbens.
7991. Paspalum plicatulum.
7992. Panicum pilosum.
7993. Panicum laxum.
7994. Cenchrus echinatus.
7995. Paspalum plicatulum.
7996. Paspalum vaginatum.
7997. Panicum ghiesbreghtii.
7998. Paspalum notatum.
7999. Echinochloa crusgalli crus-pavonis.
8000. Ichnanthus tenuis.
8001. Cenchrus echinatus.
8002. Sorghum halepense.
8003. Lasiacis sorghoidea.
8004. Paspalum centrale.
8005. Paspalum centrale.
8006. Hackelochloa granularis.
8007. Leersia hexandra.
8008. Paspalum centrale.
8009. Paspalum notatum.
8010. Paspalum plicatulum.
8011. Paspalum microstachyum.
8012. Andropogon saccharoides.
8013. Andropogon virginicus.
8014. Panicum ghiesbreghtii.
8015. Panicum trichanthum.
8016. Panicum pilosum.
8017. Paspalum subciliatum.
8018. Axonopus purpusii.
8019. Axonopus centralis.
8020. Paspalum densum.
8022. Panicum trichoides.
8023. Ichnanthus pallens.

HITCHCOCK, A. S.—Continued

8024. Paspalum plicatulum.
8025. Paspalum microstachyum.
8026. Setaria vulpiseta.
8027. Panicum laxum.
8028. Axonopus compressus.
8029. Panicum pilosum.
8030. Hymenachne amplexicaulis.
8031. Paspalum repens.
8031½. Panicum barbinode.
8032. Eragrostis ciliaris.
8033. Andropogon glomeratus.
8034. Paspalum vaginatum.
8035. Sporobolus indicus.
8036. Sporobolus littoralis.
8037. Sporobolus littoralis.
8038. Andropogon glomeratus.
8039. Leptochloa virgata.
8040. Chloris petraea.
8041. Sporobolus indicus.
8042. Paspalum vaginatum.
8043. Cenchrus viridis.
8044. Panicum pilosum.
8045. Paspalum saccharoides.
8046. Setaria vulpiseta.
8047. Paspalum nutans.
8048. Gynerium sagittatum.
8049. Imperata contracta.
8050. Andropogon bicornis.
8051. Homolepis aturensis.
8052. Eragrostis ciliaris.
8053. Chloris radiata.
8054. Lasiacis sorghoidea.
8055. Paspalum paniculatum.
8056. Andropogon condensatus.
8057. Panicum fasciculatum.
8058. Digitaria horizontalis.
8059. Paspalum centrale.
8060. Lasiacis ruscifolia.
8061. Eragrostis amabilis.
8062. Setaria geniculata.
8063. Axonopus compressus.
8064. Cenchrus viridis.
8065. Panicum ghiesbreghtii.
8066. Sporobolus indicus.
8067. Panicum molle.
8068. Lasiacis ruscifolia.
8069. Paspalum microstachyum.
8070. Uniola pittieri.
8071. Paspalum paniculatum.
8072. Eragrostis ciliaris.
8073. Chloris radiata.

HITCHCOCK, A. S.—Continued

8074. Dactyloctenium aegyptium.
8075. Eleusine indica.
8076. Panicum fasciculatum.
8077. Axonopus centralis.
8078. Digitaria horizontalis.
8079. Panicum fasciculatum.
8080. Panicum maximum.
8081. Leptochloa filiformis.
8082. Paspalum virgatum.
8083. Panicum pilosum.
8084. Andropogon bicornis.
8085. Setaria tenax.
8086. Andropogon semiberbis.
8087. Lasiacis procerrima.
8088. Paspalum decumbens.
8089. Axonopus polophyllus.
8090. Trachypogon montufari.
8091. Andropogon semiberbis.
8092. Thrasya petrosa.
8093. Setaria vulpiseta.
8094. Panicum ghiesbreghtii.
8095. Pennisetum setosum.
8096. Paspalum pectinatum.
8097. Trichachne insularis.
8098. Uniola pittieri.
8099. Paspalum propinquum.
8100. Eragrostis prolifera.
8101. Olyra latifolia.
8111. Eragrostis amabilis.
8112. Panicum zizanioides.
8114. Paspalum fasciculatum.
8115. Paspalum decumbens.
8122. Setaria paniculifera.
8123. Paspalum minus.
8124. Paspalum plicatulum.
8129. Homolepis aturensis.
8130. Paspalum pilosum.
8131. Andropogon bicornis.
8134. Panicum laxum.
8136. Paspalum notatum.
8137. Eragrostis acutiflora.
8138. Paspalum plicatulum.
8139. Panicum pilosum.
8140. Thrasya hitchcockii.
8140½. Thrasya petrosa.
8141. Paspalum decumbens.
8142. Andropogon tener.
8143. Andropogon virginicus.
8145. Andropogon leucostachyus.
8146. Andropogon semiberbis.
8147. Panicum stenodoides.

HITCHCOCK, A. S.—Continued

8148½. Axonopus purpusii.
8149. Digitaria singularis.
8150. Arthrostylidium racemiflorum.
8151. Paspalum microstachyum.
8152. Hackelochloa granularis.
8153. Eragrostis acutiflora.
8154. Andropogon selloanus.
8154½. Eragrostis acutiflora.
8155. Uniola pittieri.
8156. Trichachne insularis.
8157. Aristida jorullensis.
8158. Trichachne insularis.
8159. Digitaria panicea.
8161. Eragrostis ciliaris.
8163. Digitaria horizontalis.
8164. Cenchrus pauciflorus.
8165. Paspalum propinquum.
8167. Panicum altum.
8168. Panicum molle.
8169. Paspalum gardnerianum.
8170. Aristida jorullensis.
8171. Setaria geniculata.
8172. Panicum sphaerocarpon.
8173. Hyparrhenia bracteata.
8174. Epicampes emersleyii.
8175. Andropogon tener.
8176. Digitaria curtigluma.
8177. Paspalum plicatulum.
8178. Panicum viscidellum.
8179. Pseudechinolaena polystachya.
8180. Eleusine indica.
8182. Andropogon bicornis.
8183. Arundinella hispida.
8184. Sorghastrum incompletum.
8185. Andropogon condensatus.
8186. Paspalum humboldtianum.
8188. Trachypogon plumosus.
8189. Panicum olivaceum.
8190. Paspalum plicatulum.
8191. Axonopus scoparius.
8192. Paspalum pilosum.
8193. Paspalum conjugatum.
8194. Oplismenus hirtellus.
8195. Ichnanthus nemorosus.
8196. Panicum cordovense.
8197. Festuca eminens.
8198. Zeugites mexicana.
8199. Lasiacis oaxacensis.
8200. Chusquea serrulata.
8201. Lasiacis oaxacensis.
8205. Ichnanthus nemorosus.

HITCHCOCK, A. S.—Continued

8206. Aegopogon cenchroides.
8207. Agrostis tolucensis.
8208. Festuca amplissima.
8209. Trisetum irazuense.
8210. Brachypodium mexicanum.
8211. Chusquea serrulata.
8214. Bromus exaltatus.
8215. Cinna poaeformis.
8217. Agrostis tolucensis.
8218. Aegopogon cenchroides.
8219. Cortaderia nitida.
8220. Festuca dolichophylla.
8221. Trisetum irazuense.
8222. Trisetum pringlei.
8223. Agrostis tolucensis.
8224. Trisetum irazuense.
8225. Festuca eminens.
8226. Festuca amplissima.
8227. Festuca dolichophylla.
8228. Trisetum pringlei.
8229. Aegopogon cenchroides.
8230. Paspalum nutans.
8231. Axonopus scoparius.
8232. Polypogon elongatus.
8233. Digitaria sanguinalis.
8234. Paspalum minus.
8235. Paspalum heterotrichon.
8236. Aegopogon cenchroides.
8237. Andropogon hirtiflorus.
8238. Andropogon hirtiflorus.
8239. Andropogon hirtiflorus.
8240. Andropogon bicornis.
8240½. Andropogon leucostachyus.
8241. Epicampes emersleyii.
8242. Epicampes emersleyii.
8243. Andropogon hirtiflorus.
8244. Sorghastrum incompletum.
8245. Digitaria horizontalis
8246. Andropogon tener.
8247. Rottboellia aurita.
8248. Sporobolus elongatus.
8249. Aegopogon cenchroides.
8250. Pennisetum complanatum.
8252. Panicum olivaceum.
8253. Trisetum deyeuxioides.
8254. Elyonurus tripsacoides ciliaris.
8258. Andropogon bicornis.
8261. Phragmites communis.
8262. Digitaria horizontalis.
8265. Eriochrysis cayennensis.
8266. Panicum barbinode.

HITCHCOCK, A. S.—Continued

8267. Lasiacis oaxacensis.
8268. Ichnanthus nemorosus.
8269. Lasiacis sorghoidea.
8270. Lasiacis sorghoidea.
8271. Panicum cordovense.
8272. Paspalum paniculatum.
8273. Ichnanthus pallens.
8274. Ichnanthus tenuis.
8275. Panicum cordovense.
8276. Ichnanthus nemorosus.
8277. Isachne arundinacea.
8278. Panicum schiffneri.
8279. Eragrostis tephrosanthos.
8280. Panicum olivaceum.
8281. Lasiacis oaxacensis.
8282. Lasiacis sorghoidea.
8283. Lasiacis procerrima.
8284. Andropogon glomeratus.
8285. Setaria geniculata.
8286. Lasiacis sorghoidea.
8288. Sporobolus elongatus.
8289. Andropogon glomeratus.
8291. Setaria tenacissima.
8292. Paspalum plicatulum.
8293. Paspalum plicatulum.
8294. Hackelochloa granularis.
8295. Hyparrhenia bracteata.
8296. Elyonurus tripsacoides.
8297. Paspalum heterotrichon.
8298. Paspalum pilosum.
8299. Panicum sellowii.
8300. Leersia grandiflora.
8301. Pseudechinolaena polystachya.
8302. Ichnanthus pallens.
8303. Panicum cordovense.
8304. Oplismenus burmanni.
8305. Panicum schiffneri.
8306. Ichnanthus pallens.
8307. Arundinella deppeana.
8308. Pharus glaber.
8309. Oplismenus hirtellus.
8311. Lasiacis sorghoidea.
8312. Oplismenus hirtellus.
8313. Panicum pantrichum.
8314. Digitaria sanguinalis.
8315. Lasiacis sorghoidea.
8316. Muhlenbergia ciliata.
8317. Panicum virgultorum.
8318. Ichnanthus nemorosus.
8319. Eriochrysis cayennensis.
8320. Arundinella hispida.

HITCHCOCK, A. S.—Continued

8321. Arundinella hispida.
8328. Panicum cordovense.
8329. Ichnanthus nemorosus.
8330. Trachypogon montufari.
8331. Muhlenbergia tenella.
8332. Paspalum convexum.
8333. Isachne polygonoides.
8334. Panicum laxum.
8335. Panicum cayennense.
8336. Eragrostis acutiflora.
8337. Andropogon virgatus.
8339. Paspalum subciliatum.
8339½. Paspalum plicatulum.
8340. Epicampes emersleyii.
8341. Axonopus compressus.
8342. Axonopus purpusii.
8343. Panicum sphaerocarpon.
8344. Thrasya petrosa.
8345. Paspalum centrale.
8346. Panicum laxum.
8347. Panicum pilosum.
8348. Paspalum microstachyum.
8349. Paspalum paniculatum.
8350. Panicum laxum.
8351. Panicum zizanioides.
8352. Homolepis aturensis.
8353. Eragrostis acutiflora.
8354. Aristida jorullensis.
8355. Sporobolus ciliatus.
8356. Leptochloa virgata.
8357. Imperata contracta.
8358. Panicum fasciculatum.
8359. Paspalum boscianum.
8360. Hackelochloa granularis.
8361. Paspalum decumbens.
8362. Axonopus purpusii.
8363. Andropogon leucostachyus.
8364. Andropogon leucostachyus.
8365. Paspalum pilosum.
8366. Andropogon selloanus.
8367. Paspalum notatum.
8368. Axonopus purpusii.
8369. Paspalum convexum.
8372. Panicum cayennense.
8373. Eragrostis ciliaris.
8374. Eragrostis amabilis.
8375. Isachne polygonoides.
8376. Sporobolus ciliatus.
8377. Panicum ghiesbreghtii.
8378. Eragrostis maypurensis.
8379. Eragrostis tephrosanthos.

HITCHCOCK, A. S.—Continued

8380. Chloris radiata.
8381. Ischaemum rugosum.
8382. Panicum hirsutum.
8383. Panicum trichanthum.
8384. Panicum trichoides.
8385. Panicum zizanioides.
8386. Imperata contracta.
8387. Panicum milleflorum.
8388. Panicum stagnatile.
8389. Paspalum orbiculatum.
8390. Saccharum officinarum.
8391. Setaria paniculifera.
8392. Panicum hirsutum.
8393. Lasiacis procerrima.
8394. Ichnanthus tenuis.
8395. Panicum polygonatum.
8396. Panicum pilosum.
8397. Panicum hirsutum.
8398. Ichnanthus axillaris.
8399. Panicum stoloniferum.
8400. Panicum boliviense.
8401. Lasiacis ruscifolia.
8402. Aristida ternipes.
8403. Paspalum vaginatum.
8404. Digitaria argillacea.
8405. Sporobolus ciliatus.
8406. Leptochloa filiformis.
8407. Eragrostis acutiflora.
8408. Aristida jorullensis.
8409. Bouteloua americana.
8410. Spartina spartinae.
8411. Sporobolus indicus.
8412. Setaria paniculifera.
8413. Axonopus compressus.
8414. Imperata contracta.
8415. Digitaria sanguinalis.
8416. Paspalum paniculatum.
8417. Chloris radiata.
8418. Paspalum vaginatum.
8419. Eragrostis amabilis.
8420. Eragrostis ciliaris.
8421. Panicum polygonatum.
8422. Eragrostis tephrosanthos.
8423. Setaria geniculata.
8424. Paspalum fasiculatum.
8425. Paspalum plicatulum.
8426. Oryza latifolia.
8427. Andropogon glomeratus.
8428. Chloris radiata.
8429. Panicum laxum.
8430. Digitaria horizontalis.

HITCHCOCK, A. S.—Continued

8431. Paspalum decumbens.
8432. Paspalum orbiculatum.
8433. Leptochloa virgata.
8434. Panicum trichanthum.
8435. Panicum hirsutum.
8436. Cenchrus viridis.
8437. Anthephora hermaphrodita.
8438. Paspalum saccharoides.
8439. Andropogon condensatus.
8440. Chaetium bromoides.
8444. Eragrostis ciliaris.
8445. Lasiacis procerrima.
8446. Polypogon elongatus.
8447. Leersia hexandra.
8448. Pennisetum distachyum.
8449. Digitaria argillacea.
8450. Oplismenus burmanni.
8451. Lasiacis sorgholdea.
8452. Panicum ghiesbreghtii.
8453. Echinochloa crusgalli crus-pavonis.
8454. Paspalum notatum.
8455. Panicum laxum.
8456. Chloris radiata.
8457. Trichachne pittieri.
8458. Andropogon bicornis.
8459. Muhlenbergia implicata.
8460. Muhlenbergia tenella.
8461. Hackelochloa granularis.
8462. Paspalum pilosum.
8463. Setaria geniculata.
8464. Paspalum fasciculatum.
8465. Andropogon glomeratus.
8466. Paspalum plicatulum.
8467. Paspalum virgatum.
8468. Paspalum paniculatum.
8469. Chloris orthonoton.
8470. Sporobolus elongatus.
8471. Eragrostis limbata.
8472. Paspalum nutans.
8473. Euchlæna mexicana.
8474. Paspalum convexum.
8475. Brachiaria plantaginea.
8476. Poa annua.
8477. Paspalum candidum.
8478. Tricholaena rosea.
8479. Ichnanthus nemorosus.
8480. Leersia grandiflora.
8481. Oplismenus hirtellus.
8482. Pseudechinolaena polystachya.
8483. Andropogon virginicus.

HITCHCOCK, A. S.—Continued

8484. Oplismenus burmanni.
8486. Sporobolus purpurascens.
8487. Panicum parviglume.
8488. Lasiacis oaxacensis.
8489. Paspalum costaricense.
8490. Panicum virgultorum.
8493. Eragrostis limbata.
8494. Digitaria argillacea.
8495. Paspalum distichum.
8496. Lasiacis oaxacensis.
8497. Paspalum minus.
8498. Digitaria villosa.
8500. Oplismenus hirtellus.
8501. Muhlenbergia tenella.
8502. Lasiacis rhizophora.
8503. Olyra latifolia.
8504. Arundinella berteroniana.
8509. Muhlenbergia tenella.
8510. Paspalum plicatulum.
8511. Muhlenbergia implicata.
8512. Eragrostis limbata.
8513. Arthrostylidium racemiflorum.
8514. Gynerium sagittatum.
8515. Pennisetum setosum.
8516. Leptochloa virgata.
8517. Panicum hirticaule.
8518. Trichachne insularis.
8519. Cenchrus echinatus.
8520. Oplismenus burmanni.
8521. Panicum trichoides.
8522. Brachiaria plantaginea.
8522½. Paspalum convexum.
8523. Paspalum microstachyum.
8524. Paspalum convexum.
8524½. Paspalum centrale.
8525. Anthephora hermaphrodita.
8526. Eragrostis maypurensis.
8527. Aristida ternipes.
8528. Diectomis fastigiata.
8529. Tricholaena rosea.
8530. Bouteloua pilosa.
8531. Echinochloa colonum.
8532. Paspalum centrale.
8533. Eragrostis prolifera.
8534. Dactyloctenium aegyptium.
8536. Uniola pittieri.
8537. Bouteloua americana.
8538. Bouteloua alamosana.
8539. Eragrostis maypurensis.
8540. Cenchrus pauciflorus.
8541. Oplismenus burmanni.

HITCHCOCK, A. S.—Continued

8542. Oplismenus burmanni.
8543. Paspalum centrale.
8544. Paspalum centrale.
8545. Panicum barbinode.
8546. Digitaria horizontalis.
8547. Digitaria horizontalis.
8548. Bouteloua repens.
8549. Bouteloua repens.
8550. Eragrostis maypurensis.
8551. Hackelochloa granularis.
8552. Panicum fasciculatum.
8553. Digitaria horizontalis.
8554. Paspalum microstachyum.
8555. Panicum trichoides.
8556. Bouteloua pilosa.
8557. Hymenachne amplexicaulis.
8558. Oryza latifolia.
8559. Paspalum paniculatum.
8560. Gynerium sagittatum.
8561. Eragrostis tephrosanthos.
8562. Eragrostis cilianensis.
8563. Leptochloa filiformis.
8564. Panicum pilosum.
8565. Leptochloa virgata.
8566. Panicum laxum.
8567. Cenchrus viridis.
8568. Setaria geniculata.
8569. Paspalum centrale.
8570. Lasiacis ruscifolia.
8571. Lasiacis ruscifolia.
8572. Lasiacis procerrima.
8573. Aristida ternipes.
8574. Digitaria argillacea.
8575. Bouteloua pilosa.
8576. Paspalum fasciculatum.
8577. Lasiacis ruscifolia.
8578. Gynerium sagittatum.
8579. Paspalum virgatum.
8580. Arthrostylidium pittieri.
8581. Lasiacis ruscifolia.
8582. Paspalum repens.
8583. Paspalum minus.
8584. Arundinella deppeana.
8585. Panicum molle.
8586. Bouteloua americana.
8587. Paspalum propinquum.
8588. Eragrostis ciliaris.
8589. Eragrostis tephrosanthos.
8590. Andropogon semiberbis.
8591. Aristida ternipes.
8592. Chloris radiata.

HITCHCOCK, A. S.—Continued

8593. Heteropogon contortus.
8594. Paspalum paniculatum.
8595. Anthephora hermaphrodita.
8596. Cenchrus pilosus.
8597. Bouteloua americana.
8598. Cenchrus echinatus.
8599. Setaria liebmanni.
8600. Trichachne insularis.
8601. Panicum ghiesbreghtii.
8602. Paspalum microstachyum.
8603. Paspalum vaginatum.
8604. Panicum trichoides.
8605. Digitaria sanguinalis.
8606. Paspalum langei.
8607. Lasiacis ruscifolia.
8608. Jouvea pilosa.
8609. Bouteloua americana.
8610. Cenchrus viridis.
8611. Eragrostis prolifera.
8612. Eragrostis maypurensis.
8613. Paspalum paniculatum.
8614. Ixophorus unisetus.
8615. Paspalum notatum.
8616. Leptochloa filiformis.
8617. Anthephora hermaphrodita.
8618. Cenchrus pauciflorus.
8619. Cenchrus pilosus.
8620. Digitaria sanguinalis.
8621. Eragrostis tephrosanthos.
8622. Eleusine indica.
8623. Eragrostis ciliaris.
8624. Eragrostis tephrosanthos.
8625. Eragrostis cilianensis.
8626. Eragostis tephrosanthos.
8627. Eragrostis cilianensis.
8628. Cenchrus pilosus.
8629. Bouteloua pilosa.
8630. Paspalum langei.
8631. Panicum trichoides.
8632. Leptochloa filiformis.
8633. Anthephora hermaphrodita.
8634. Oplismenus burmanni.
8635. Chloris radiata.
8636. Axonopus compressus.
8637. Cenchrus echinatus.
8638. Cenchrus viridis.
8639. Paspalum virgatum.
8640. Aristida ternipes.
8641. Eragrostis maypurensis.
8642. Paspalum plicatulum.
8643. Trichachne insularis.

HITCHCOCK, A. S.—Continued

8644. Setaria geniculata.
8645. Hackelochloa granularis.
8646. Heteropogon contortus.
8647. Brachiaria plantaginea.
8648. Andropogon bicornis.
8649. Leptochloa domingensis.
8650. Paspalum microstachyum.
8652. Gouinia virgata.
8653. Bouteloua alamosana.
8654. Panicum hirticaule.
8655. Digitaria panicea.
8656. Digitaria horizontalis.
8657. Aristida jorullensis.
8658. Paspalum notatum.
8659. Paspalum convexum.
8660. Oplismenus burmanni.
8661. Setaria liebmanni.
8663. Panicum fasciculatum.
8664. Chaetium bromoides.
8665. Lasiacis sorghoidea.
8666. Chloris radiata.
8667. Cenchrus pilosus.
8668. Cenchrus viridis.
8669. Panicum trichanthum.
8670. Panicum fasciculatum.
8671. Leptochloa domingensis.
8672. Lasiacis oaxacensis.
8673. Lasiacis sloanei.
8674. Lasiacis sorghoidea.
8675. Sporobolus elongatus.
8676. Lasiacis ruscifolia.
8677. Leptochloa domingensis.
8678. Chloris radiata.
8679. Chloris radiata.
8680. Panicum zizanioides.
8681. Paspalum langei.
8682. Panicum trichanthum.
8683. Setaria vulpiseta.
8684. Paspalum propinquum.
8685. Panicum ichnanthoides.
8686. Paspalum langei.
8687. Panicum ghiesbreghtii.
8688. Olyra latifolia.
8689. Arundinella deppeana.
8690. Lasiacis sorghoidea.
8691. Paspalum plicatulum.
8692. Eragrostis maypurensis.
8693. Panicum trichoides.
8694. Lasiacis procerrima.
8695. Lasiacis patentiflora.
8696. Paspalum plicatulum.

HITCHCOCK, A. S.—Continued

8697. Paspalum humboldtianum.
8698. Lasiacis oaxacensis.
8699. Lasiacis sorghoidea.
8700. Lasiacis sloanei.
8701. Panicum barbinode.
8702. Pennisetum setosum.
8703. Paspalum convexum.
8704. Andropogon brevifolius.
8705. Andropogon condylotrichus.
8706. Chloris virgata.
8707. Sorghum halepense.
8708. Pennisetum setosum.
8709. Andropogon condensatus.
8710. Lasiacis ruscifolia.
8711. Digitaria panicea.
8712. Gynerium sagittatum.
8713. Phragmites communis.
8714. Paspalum microstachyum.
8715. Lasiacis ruscifolia.
8716. Axonopus centralis.
8717. Lasiacis ruscifolia.
8718. Lasiacis leptostachya.
8719. Lasiacis ruscifolia.
8720. Tripsacum latifolium.
8721. Olyra latifolia.
8722. Lasiacis divaricata.
8723. Lasiacis divaricata.
8724. Paspalum langei.
8725. Oplismenus burmanni.
8726. Bouteloua pilosa.
8727. Andropogon brevifolius.
8728. Eragrostis cilianensis.
8729. Digitaria horizontalis.
8730. Andropogon saccharoides.
8731. Hyparrhenia ruprechtii.
8732. Tripsacum latifolium.
8733. Pennisetum setosum.
8735. Heteropogon melanocarpus.
8736. Diectomis fastigiata.
8737. Gynerium sagittatum.
8738. Pennisetum setosum.
8739. Cenchrus pilosus.
8740. Leersia hexandra.
8741. Echinochloa colonum.
8742. Aristida ternipes.
8743. Lasiacis ruscifolia.
8744. Paspalum langei.
8745. Oryza latifolia.
8746. Andropogon brevifolius.
8747. Axonopus compressus.
8748. Panicum laxum.

HITCHCOCK, A. S.—Continued

8749. Eriochloa pacifica.
8750. Ixophorus unisetus.
8751. Bouteloua americana.
8752. Bouteloua alamosana.
8753. Eragrostis maypurensis.
8754. Paspalum centrale.
8755. Panicum ghiesbreghtii.
8756. Bouteloua repens.
8756½. Setaria geniculata.
8758. Dactyloctenium aegyptium.
8759. Eragrostis cilianensis.
8760. Jouvea pilosa.
8761. Paspalum propinquum.
8762. Panicum maximum.
8763. Lasiacis ruscifolia.
8764. Gouinia virgata.
8765. Oplismenus burmanni.
8766. Axonopus compressus.
8767. Bouteloua alamosana.
8768. Panicum trichoides.
8769. Bouteloua pilosa.
8770. Aristida ternipes.
8771. Bouteloua americana.
8772. Bouteloua alamosana.
8773. Cenchrus viridis.
8774. Bouteloua repens.
8775. Fourniera mexicana.
8776. Cathestecum stoloniferum.
8777. Aristida jorullensis.
8778. Panicum fasciculatum.
8779. Sporobolus argutus.
8780. Paspalum vaginatum.
8781. Leptochloa filiformis.
8782. Eragrostis simpliciflora.
8783. Axonopus capillaris.
8783½. Axonopus compressus.
8784. Eragrostis tephrosanthos.
8784½. Axonopus fissifolius.
8785. Eragrostis tephrosanthos.
8786. Aristida ternipes.
8787. Bouteloua americana.
8788. Paspalum centrale.
8789. Paspalum centrale.
8790. Oplismenus burmanni.
8791. Panicum trichoides.
8792. Bouteloua pilosa.
8793. Echinochloa colonum.
8794. Panicum hirticaule.
8795. Pennisetum setosum.
8796. Diectomis fastigiata.
8797. Aristida ternipes.

HITCHCOCK, A. S.—Continued

8842. Olyra latifolia.
8850. Lasiacis ruscifolia.
8851. Arundinella deppeana.
8853. Lasiacis oaxacensis.
8854. Paspalum propinquum.
8855. Eragrostis cilianensis.
8856. Olyra latifolia.
8859. Aristida jourullensis.
8860. Panicum molle.
8861. Andropogon condensatus.
8862. Eragrostis tephrosanthos.
8877. Lasiacis oaxacensis.
8895. Paspalum humboldtianum.
8903. Lasiacis ruscifolia.
8911. Gynerium sagittatum.
8916. Bambusa vulgaris.
8918. Paspalum repens.
8919. Phragmites communis.
8920. Panicum geminatum.
8921. Lasiacis sorghoidea.
8922. Leptochloa filiformis.
8923. Eragrostis tephrosanthos.
8924. Panicum hirticaule.
8925. Lasiacis sorghoidea.
8926. Digitaria sanguinalis.
8927. Muhlenbergia setarioides.
8928. Eragrostis limbata.
8929. Muhlenbergia diversiglumis.
8930. Oplismenus hirtellus.
8931. Paspalum convexum.
8932. Trisetum deyeuxoides pubescens.
8933. Aegopogon tenellus.
8934. Paspalum tenellum.
8935. Paspalum tenellum.
8936. Paspalum nutans.
8937. Paspalum candidum.
8938. Muhlenbergia ciliata.
8939. Muhlenbergia diversiglumis.
8940. Andropogon saccharoides.
8941. Gymnopogon aristiglumis.
8942. Andropogon saccharoides.
8943. Pennisetum complanatum.
8944. Eragrostis tephrosanthos.
8945. Andropogon glomeratus.
8946. Paspalum trachycoleon.
8947. Tripsacum laxum.
8948. Muhlenbergia implicata.
8949. Oplismenus burmanni.
8950. Chaetium bromoides.
8951. Lasiacis sorghoidea.

HITCHCOCK, A. S.—Continued

8952. Lasiacis sorghoidea.
8953. Paspalum conxexum.
8954. Eragrostis lugens.
8955. Trachypogon montufari.
8956. Paspalum langei.
8957. Paspalum costaricense.
8958. Paspalum tenellum.
8959. Paspalum costaricense.
8960. Paspalum propinquum.
8961. Brachiaria plantaginea.
8962. Lasiacis patentiflora.
8963. Andropogon condensatus.
8964. Arundinella deppeana.
8965. Bouteloua curtipendula.
8966. Paspalum fasciculatum.
8967. Leptochloa virgata.
8968. Oryza latifolia.
8969. Hymenachne amplexicaulis.
8970. Coix lacryma-jobi.
8971. Panicum laxum.
8972. Arundinella berteroniana.
8973. Pennisetum complanatum.
8974. Muhlenbergia tenella.
8975. Bouteloua americana.
8976. Diectomis fastigiata.
8977. Ixophorus unisetus.
8978. Cenchrus pilosus.
8979. Lasiacis ruscifolia.
8980. Paspalum microstachyum.
8981. Panicum trichoides.
8982. Lasiacis ruscifolia.
8983. Bouteloua pilosa.
8984. Leptochloa scabra.
8985. Jouvea pilosa.
8986. Leptochloa filiformis.
8987. Bouteloua americana.
8988. Eragrostis prolifera.
8989. Gouinia virgata.
8990. Axonopus compressus.
8991. Aristida jorullensis.
8992. Paspalum centrale.
8993. Panicum ghiesbreghtii.
8994. Jouvea pilosa.
8995. Bouteloua alamosana.
8996. Bouteloua repens.
8997. Cenchrus pilosus.
8998. Axonopus compressus.
8999. Eleusine indica.
9000. Paspalum virgatum.
9001. Panicum maximum.
9002. Digitaria sanguinalis.

HITCHCOCK, A. S.—Continued

9003. Cenchrus viridis.
9004. Setaria geniculata.
9005. Cynodon dactylon.
9006. Paspalum conjugatum.
9007. Panicum barbinode.
9008. Trichachne insularis.
9009. Anthephora hermaphrodita.
9010. Eragrostis tephrosanthos.
9011. Andropogon brevifolius.
9012. Sporobolus elongatus.
9013. Muhlenbergia implicata.
9014. Panicum lepidulum.
9015. Paspalum plicatulum.
9016. Eragrostis lugens.
9017. Paspalum convexum.
9018. Andropogon saccharoides.
9019. Andropogon saccharoides laguroides.
9020. Paspalum notatum.
9021. Sorghastrum incompletum.
9022. Andropogon hirtiflorus.
9023. Diectomis fastigiata.
9024. Elyonurus tripsacoides.
9025. Setaria geniculata.
9026. Aristida adscensionis.
9027. Aristida divaricata.
9028. Andropogon saccharoides berteroanus.
9029. Bouteloua pilosa.
9030. Muhlenbergia implicata.
9031. Pereilema crinitum.
9032. Heteropogon contortus.
9033. Paspalum humboldtianum.
9033½. Paspalum cymbiforme.
9034. Andropogon malacostachyus.
9035. Epicampes stricta.
9036. Lasiacis sorghoidea.
9037. Poa annua.
9038. Aristida divaricata.
9039. Chloris orthonoton.
9040. Chaetium bromoides.
9041. Aegopogon cenchroides.
9042. Pennisetum complanatum.
9043. Pennisetum complanatum.
9044. Oplismenus burmanni.
9045. Lasiacis oaxacensis.
9046. Oplismenus rariflorus.
9046½. Oplismenus rariflorus.
9047. Ichnanthus nemorosus.
9048. Sorghastrum incompletum.
9049. Muhlenbergia diversiglumis.

HITCHCOCK, A. S.—Continued

9050. Pereilema crinitum.
9051. Lasiacis rhizophora.
9052. Oplismenus burmanni.
9053. Lasiacis sorghoidea.
9054. Oplismenus hirtellus.
9055. Paspalum squamulatum.
9056. Panicum sellowii.
9057. Lasiacis sorghoidea.
9058. Pennisetum complanatum.
9059. Andropogon bicornis.
9060. Andropogon hirtiflorus.
9061. Muhlenbergia ciliata.
9062. Arundinella deppeana.
9063. Epicampes emersleyi.
9063½. Epicampes stricta.
9064. Epicampes emersleyi.
9065. Hackelochloa granularis.
9066. Andropogon brevifolius.
9067. Lasiacis procerrima.
9068. Eragrostis lugens.
9069. Eragrostis limbata.
9070. Eragrostis ciliaris.
9071. Brachiaria plantaginea.
9072. Andropogon condensatus.
9073. Aristida schiedeana.
9074. Panicum virgultorum.
9075. Trachypogon montufari.
9076. Aristida arizonica.
9077. Pennisetum complanatum.
9078. Paspalum botterii.
9079. Paspalum adoperiens.
9080. Lasiacis oaxacensis.
9081. Epicampes stricta.
9082. Arthrostylidium racemiflorum.
9083. Cenchrus echinatus.
9084. Hilaria cenchroides.
9085. Andropogon saccharoides.
9086. Aristida divaricata.
9087. Elionurus tripsacoides ciliaris.
9088. Tricholaena rosea.
9089. Leersia hexandra.
9090. Eragrostis simpliciflora.
9091. Eragrostis limbata.
9092. Muhlenbergia diversiglumis.
9093. Paspalum tenellum.
9094. Paspalum lentiginosum.
9095. Paspalum convexum.
9096. Digitaria panicea.
9097. Aristida adscensionis.
9098. Echinochloa crusgalli crus-pavonis.

HITCHCOCK, A. S.—Continued

9099. Paspalum tenellum.
9100. Eragrostis viscosa.
9101. Lasiacis sorghoidea.
9102. Aristida arizonica.
9103. Eragrostis limbata.
9104. Bouteloua filiformis.
9105. Panicum sphaerocarpon.
9106. Panicum villosissimum.
9107. Lasiacis oaxacensis.
9108. Aegopogon cenchroides.
9109. Epicampes emersleyi.
9110. Oplismenus setarius.
9111. Brachypodium mexicanum.
9112. Calamagrostis junciformis.
9113. Bromus exaltatus.
9114. Agrostis tolucensis.
9115. Poa seleri.
9116. Agrostis hoffmanni.
9117. Epicampes macroura.
9118. Festuca amplissima.
9119. Hierochloa mexicana.
9120. Calamagrostis guatemalensis.
9121. Trisetum deyeuxioides.
9122. Triniochloa stipoides.
9123. Stipa ichu.
9124. Bromus laciniatus.
9125. Sporobolus ramulosus.
9126. Festuca amplissima.
9127. Zeugites munroana.
9128. Trachypogon montufari.
9129. Epicampes stricta.
9130. Sporobolus minutissimus.
9131. Digitaria velutina.
9132. Sorghastrum nutans.
9133. Muhlenbergia microsperma.
9134. Muhlenbergia setarioides.
9135. Muhlenbergia ciliata.
9136. Muhlenbergia ciliata.
9137. Brachypodium mexicanum.
9138. Triniochloa stipoides.
9139. Panicum albomaculatum.
9140. Epicampes macroura.
9141. Muhlenbergia elata.
9142. Trisetum deyeuxioides pubescens.
9143. Digitaria velutina.
9144. Paspalum candidum.
9145. Bromus laciniatus.
9146. Epicampes stricta.
9147. Panicum aquaticum.
9148. Paspalum urvillei.

HITCHCOCK, A. S.—Continued

9149. Panicum trichanthum.
9150. Paspalum fasciculatum.
9151. Axonopus compressus.
9152. Digitaria horizontalis.
9153. Panicum stagnatile.
9154. Paspalum affine.
9155. Setaria paniculifera.
9156. Eriochloa punctata.
9156½. Homolepis aturensis.
9157. Paspalum decumbens.
9158. Leptochloa virgata.
9159. Panicum pilosum.
9160. Panicum laxum.
9161. Paspalum minus.
9162. Bouteloua filiformis.
9163. Eragrostis limbata.
9164. Ichnanthus pallens.
9165. Oplismenus burmanni.
9166. Ichnanthus tenuis.
9167. Ichnanthus tenuis.
9168. Panicum haenkianum.
9169. Andropogon brevifolius.
9170. Hymenachne donacifolia.
9171. Isachne polygonoides.
9172. Panicum polygonatum.
9173. Setaria geniculata.
9174. Lasiacis oaxacensis.
9175. Lasiacis sorghoidea.
9176. Oryza latifolia.
9177. Lasiacis sorghoidea.
9178. Panicum grande.
9179. Paspalum repens.
9181. Ichnanthus pallens.
9182. Lasiacis sorghoidea.
9183. Ischaemum rugosum.
9184. Oplismenus hirtellus.
9185. Panicum fasciculatum.
9186. Ichnanthus tenuis.
9187. Andropogon semiberbis.
9188. Paspalum multicaule.
9189. Diectomis fastigiata.
9190. Andropogon angustatus.
9191. Eragrostis maypurensis.
9192. Thrasya campylostachya.
9193. Thrasya petrosa.
9194. Aristida recurvata.
9195. Trachypogon montufari.
9196. Digitaria singularis.
9197. Aristida capillacea.
9197½. Paspalum multicaule.
9198. Isachne polygonoides.

HITCHCOCK, A. S.—Continued

9199. Arundinella deppeana.
9200. Panicum pulchellum.
9201. Ichnanthus pallens.
9202. Aristida jorullensis.
9203. Sporobolus ciliatus.
9204. Lasiacis ruscifolia.
9206. Panicum haenkeanum.
9207. Panicum stenodoides.
9208. Panicum pilosum.
9209. Orthoclada laxa.
9210. Ichnanthus pallens.
9212. Panicum trichanthum.
19891. Axonopus centralis.
19892. Axonopus compressus.
19893. Axonopus compressus.
22552½. Arthrostylidium racemiflorum.
22941. Ischaemum ciliare.
22942. Diectomis fastigiata.
22943. Bouteloua pilosa.
22944. Oplismenus hirtellus.
22945. Panicum pulchellum.
22946. Aristida capillacea.
22947. Aristida jorullensis.
22948. Digitaria sanguinalis.
22949. Orthoclada laxa.
22950. Eragrostis maypurensis.
22951. Ichnanthus pallens.
22952. Chusquea simpliciflora.
22953. Paspalum plicatulum.

HOLWAY, E. W. D.

15. Andropogon saccharoides berteronianus.
24. Setaria geniculata.
26. Epicampes macroura.
35. Trisetum deyeuxioides pubescens.
37. Aegopogon cenchroides.
49. Zeugites munroana.
54. Aegopogon cenchroides.
57. Andropogon hirtiflorus.
58. Trisetum deyeuxioides.
59. Triniochloa stipoides.
64. Paspalum humboldtianum.
114. Andropogon hirtiflorus.
129. Paspalum humboldtianum.
164. Aegopogon cenchroides.
167. Eragrostis limbata.
168. Paspalum candidum.

HOLWAY, E. W. D.—Continued

178. Andropogon condensatus.
205. Trichachne insularis.
255. Eragrostis limbata.
256. Muhlenbergia tenella.
304. Muhlenbergia tenella.
317. Andropogon brevifolius.
342. Cenchrus echinatus.
408. Muhlenbergia tenella.
421. Eragrostis tephrosanthos.
431. Arundinella deppeana.
590. Panicum maximum.
591. Cenchrus echinatus.
592. Cynodon dactylon.
594. Paspalum conjugatum.
599. Cynodon dactylon.
600. Anthephora hermaphrodita.
857. Trichachne insularis.

JIMÉNEZ, OTÓN

1. Polypogon elongatus.
2. Pennisetum distachyum.
3. Festuca elatior.
5. Muhlenbergia implicata.
7. Oplismenus burmanni.
8. Oplismenus burmanni.
9. Oplismenus burmanni.
23. Arundinella deppeana.
49. Panicum virgultorum.
82. Anthephora hermaphrodita.
113. Panicum parviglume.
126. Panicum polygonatum.
128. Paspalum candidum.
129. Oplismenus hirtellus.
132. Cenchrus echinatus.
133. Setaria paniculifera.
136. Eragrostis maypurensis.
137. Diectomis fastigiata.
141. Panicum laxum.
144. Muhlenbergia implicata.
145. Panicum trichoides.
146. Axonopus capillaris.
147. Muhlenbergia tenella.
152. Lasiacis oaxacensis.
155. Eragrostis simpliciflora.
156. Oplismenus burmanni.
157. Oplismenus burmanni.
158. Oplismenus burmanni.
159. Imperata contracta.
160. Paspalum squamulatum.
161. Pereilema crinitum.
162. Panicum pulchellum.

JIMÉNEZ, OTÓN—Continued

163. Axonopus compressus.
164. Ichnanthus tenuis.
165. Ichnanthus tenuis.
167. Pseudechinolaena polystachya.
168. Lasiacis rhizophora.
169. Arundinella berteroniana.
170. Oplismenus hirtellus.
173. Muhlenbergia setarioides.
175. Paspalum plicatulum.
176. Trichachne pittieri.
178. Andropogon brevifolius.
179. Triniochloa stipoides.
180. Andropogon bicornis.
361. Lasiacis ruscifolia.
368. Setaria vulpiseta.
369. Lasiacis ruscifolia.
372. Bouteloua pilosa.
376. Lasiacis ruscifolia.
377. Olyra latifolia.
378. Lasiacis divaricata.
387. Paspalum variabile.
397. Arundinella berteroniana.
402. Setaria paniculifera.
403. Panicum parviglume.
405. Andropogon condensatus.
406. Eragrostis simpliciflora.
407. Eragrostis maypurensis.
408. Diectomis fastigiata.
409. Aristida jorullensis.
410. Setaria paniculifera.
412. Axonopus aureus.
439. Eragrostis cilianensis.
440. Dactyloctenium aegyptium.
442. Hackelochloa granularis.
459. Panicum strigosum.
484. Trisetum pringlei.
518. Lasiacis rhizophora.
519. Andropogon leucostachyus.
520. Paspalum plenum.
521. Brachiaria plantaginea.
522. Pennisetum vulcanicum.
523. Setaria geniculata.
525. Panicum fasciculatum.
526. Sporobolus indicus.
527. Echinochloa crusgalli crus-pavonis.
528. Paspalum plicatulum.
529. Paspalum humboldtianum.
530. Panicum ghiesbreghtii.
531. Lasiacis ruscifolia.
532. Lasiacis procerrima.

JIMÉNEZ, OTÓN—Continued

533. Paspalum plenum.
534. Paspalum pilosum.
535. Isachne arundinacea.
698. Pennisetum setosum.
699. Leersia grandiflora.
700. Pseudechinolaena polystachya.
701. Ichnanthus tenuis.
702. Arundinella berteroniana.
703. Lasiacis rhizophora.
704. Oplismenus burmanni.
705. Ichnanthus tenuis.
707. Trichachne pittieri.
708. Trachypogon montufari mollis.
709. Pereilema crinitum.
710. Aegopogon cenchroides.
713. Eragrostis secundiflora.
714. Bouteloua repens.
715. Diectomis fastigiata.
716. Aristida ternipes.
717. Bouteloua pilosa.
718. Andropogon brevifolius.
719. Olyra latifolia.
720. Lasiacis scabrior.
721. Leptochloa virgata.
722. Panicum barbinode.
723. Uniola pittieri.
724. Lasiacis oaxacensis.
725. Lasiacis ruscifolia.
726. Paspalum repens.
727. Panicum megiston.
728. Oryza latifolia.
729. Leersia hexandrus.
730. Panicum ghiesbreghtii.
731. Hymenachne amplexicaulis.
732. Oryza latifolia.
733. Leersia hexandrus.
734. Panicum geminatum.
735. Digitaria sanguinalis.
736. Paspalum plicatulum.
737. Setaria geniculata.
738. Oplismenus burmanni.
739. Paspalum conjugatum.
740. Panicum laxum.
741. Oplismenus burmanni.
742. Paspalum jimenezii.
743. Paspalum plicatulum.
746. Melinis minutiflora.
879. Zeugites pittieri.
880. Panicum ghiesbreghtii.
881. Panicum polygonatum.
882. Imperata contracta.

JIMÉNEZ, OTÓN—Continued

883. Orthoclada laxa.
886. Lasiacis procerrima.
887. Lasiacis oaxacensis,
888. Anthephora hermaphrodita.
889. Arundinella deppeana.
890. Pereilema beyrichianum.
892. Lasiacis divaricata.
898. Oplismenus burmanni.
919. Panicum virgultorum.
920. Leersia grandiflora.
926. Echinochloa crusgalli crus-pavonis.
927. Paspalum distichum.
928. Echinochloa colonum.
951. Holcus lanatus.
952. Festuca gigantea.
953. Anthoxanthum odoratum.
963. Muhlenbergia diversiglumis.
973. Pereilema crinitum.
990. Pennisetum bambusiforme.
991. Zeugites mexicana.
1108. Pennisetum bambusiforme.
1117. Chusquea virgata.
1119. Pennisetum setosum.
1120. Panicum polygonatum.
1121. Panicum zizanioides,
1122. Diectomis fastigiata.
1123. Paspalum multicaule.
1124. Aristida capillacea.
1125. Aristida capillacea.
1126. Lasiacis procerrima.
1127. Lasiacis ruscifolia.
1128. Aristida jorullensis.
1129. Andropogon brevifolius.
1130. Axonopus aureus.
1131. Axonopus compressus.
1132. Hackelochloa granularis,
1133. Digitaria argillacea.
1137. Trachypogon montufari mollis.
1138. Anthephora hermaphrodita.
1149. Trisetum viride.
1150. Agrostis tolucensis.
1151. Sporobolus ramulosus.
1152. Agrostis tolucensis.

JOHNSON, HARRY.

6. Paspalum convexum.
29. Panicum glutinosum.
72. Pseudechinolaena polystachya.
115. Paspalum conjugatum.
116. Panicum polygonatum.

JOHNSON, HARRY—Continued

117. Digitaria sanguinalis.
118. Oplismenus burmanni.
119. Paspalum candidum.
120. Setaria geniculata.
177. Lasiacis divaricata.
260. Paspalum conjugatum.
262. Setaria geniculata.
265. Digitaria horizontalis.
279. Paspalum conjugatum pubescens.
319. Eleusine indica.
337. Panicum maximum.
425. Panicum polygonatum.
428. Axonopus compressus.
438. Panicum sellowii.
439. Paspalum plenum.
440. Paspalum plicatulum.
441. Paspalum notatum.
454. Paspalum boscianum.
456. Homolepis aturensis.
483. Pharus latifolius.
496. Panicum fasiculatum.
571. Eragrostis limbata.
595. Oplismenus setarius.
613. Panicum olivaceum.
614. Panicum laxum.
616. Poa annua.
617. Panicum multirameum.
618. Agrostis perennans.
619. Setaria geniculata.
620. Digitaria sanguinalis.
621. Paspalum candidum.
715. Lasiacis rhizophora.
831. Paspalum candidum.
832. Ischaemum latifolium.
863. Zeugites mexicana.

KELLERMAN, W. A.

4725. Panicum maximum.
4726. Leersia hexandra.
4727. Hymenachne amplexicaulis.
4735. Lasiacis sorghoidea.
4747. Calamagrostis guatemalensis.
4764. Epicampes macroura.
4766. Brachypodium mexicanum.
4780. Cenchrus echinatus.
4784. Bouteloua filiformis.
4786. Lasiacis sorghoidea.
4787. Setaria geniculata.
4790. Arundinella deppeana.
4814. Setaria verticillata.

KELLERMAN, W. A.—Continued

4815. Agrostis verticillata.
4970. Dactyloctenium aegyptium.
4986. Eragrostis amabilis.
Eragrostis tephrosanthos.
5104. Orthoclada laxa.
5108. Sporobolus elongatus.
5110. Cenchrus echinatus.
5111. Agrostis verticillata.
5112. Pennisetum complanatum.
5113. Arundinella berteroniana.
Leptochloa domingensis.
5114. Panicum polygonatum.
5115. Muhlenbergia setarioides.
5117. Digitaria horizontalis.
5118. Paspalum paniculatum.
5119. Panicum pilosum.
5153. Poa annua.
5163. Cenchrus viridis.
5515. Muhlenbergia setarioides.
5572. Aegopogon cenchroides.
5579. Calamagrostis guatemalensis.
5588. Eragrostis amabilis.
5589. Eragrostis ciliaris.
5699. Setaria geniculata.
5746. Trichachne insularis.
5756. Cynodon dactylon.
5758. Eragrostis amabilis.
5761. Paspalum paniculatum.
5778. Agrostis tolucensis.
5781. Pennisetum bambusiforme.
5803. Paspalum adoperiens.
5826. Aegopogon cenchroides.
5866. Eragrostis tephrosanthos.
5888. Aegopogon cenchroides.
5919. Sporobolus elongatus.
5932. Aegopogon cenchroides.
5948. Aegopogon cenchroides.
5976. Eragrostis ciliaris.
5984. Eragrostis ciliaris.
6071. Digitaria horizontalis.
6072. Eragrostis tephrosanthos.
6230. Aegopogon cenchroides.
6231. Panicum viscidellum.
6232. Eragrostis maypurensis.
6233. Lasiacis sorghoidea.
6234. Agrostis tolucensis.
6235. Oplismenus burmanni.
6236. Panicum sphaerocarpon.
6237. Oryza latifolia.
6239. Muhlenbergia setarioides.
6242. Tripsacum latifolium.

KELLERMAN, W. A.—Continued

6243. Lasiacis oaxacensis.
6244. Muhlenbergia tenella.
6245. Paspalum convexum.
6245½. Aegopogon cenchroides.
6246. Panicum pulchellum.
6247. Lasiacis procerrima.
6248. Pennisetum complanatum.
6249. Panicum viscidellum.
6250. Panicum geminatum.
6251. Arundinella deppeana.
6252. Cynodon dactylon.
6253. Panicum paludivagum.
6254. Panicum paludivagum.
6255. Eragrostis ciliaris.
6256. Jouvea pilosa.
6257. Dactyloctenium aegyptium.
6258. Arundinella berteroniana.
6259. Calamagrostis guatemalensis.
6260. Paspalum paniculatum.
6261. Bromus laciniatus.
6262. Pennisetum bambusiforme.
6263. Panicum trichoides.
6264. Lasiacis divaricata.
6265. Agrostis verticillata.
6266. Oplismenus burmanni.
6267. Panicum maximum.
6268. Lasiacis divaricata.
6269. Leptochloa virgata.
6270. Digitaria horizontalis.
6271. Hymenachne amplexicaulis.
6272. Panicum trichanthum.
6273. Lasiacis oaxacensis.
6274. Olyra latifolia.
6275. Eragrostis amabilis.
6276. Eragrostis cilianensis.
6552. Cynodon dactylon.
7887. Cathestecum stoloniferum.

KENOYER, L. A.

103. Streptochaeta sodiroana.
104. Pharus latifolius.
107. Ichnanthus tenuis.
108. Andropogon bicornis.
111. Setaria vulpiseta.
112. Paspalum saccharoides.
116. Panicum pilosum.
119. Chloris virgata.
120. Isachne polygonoides.
121. Panicum zizanioides.
123. Panicum megiston.
124. Panicum geminatum.

KENOYER, L. A.—Continued

125. Chusquea simpliciflora.
126. Arthrostylidium racemiflorum.
127. Leersia hexandra.
128. Paspalum decumbens.
129. Sporobolus indicus.
131. Leptochloa virgata.
262. Andropogon glomeratus.

KILLIP, E. P.

4000. Panicum pilosum.
4003. Paspalum acutum.
4006. Paspalum microstachyum.
4007. Cenchrus viridis.
4011. Paspalum pilosum.
4012. Paspalum plicatulum.
4013. Andropogen leucostachyus.
4014. Andropogon bicornis.
4015. Andropogon condensatus.
4016. Setaria geniculata.
4020. Panicum strigosum.
4021. Setaria geniculata.
4023. Setaria vulpiseta.
4024. Lasiacis procerrima.
4025. Setaria paniculifera.
4027. Paspalum minus.
4028. Lasiacis ruscifolia.
4029. Ichnanthus tenuis.
4031. Paspalum plicatulum.
4034. Uniola pittieri.
4035. Bouteloua americana.
4039. Eragrostis prolifera.
4040. Lasiacis ruscifolia.
4043. Dactyloctenium aegyptium.
4044. Eragrostis ciliaris.
4060. Isachne polygonoides.
4063. Ichnanthus axillaris.
4067. Axonopus aureus.
4077. Paspalum centrale.
4084. Paspalum boscianum.
4087. Eragrostis acutiflora.
4089. Olyra latifolia.
4094. Andropogon leucostachyus.
4095. Panicum trichanthum.
4099. Paspalum plicatulum.
4100. Panicum ghiesbreghtii.
4104. Setaria geniculata.
4105. Leptochloa virgata.
4106. Paspalum densum.
4107. Echinochloa crusgalli crus-pavonis.
4109. Paspalum virgatum.

KILLIP, E. P.—Continued

4110. Panicum barbinode.
4111. Echinochloa colonum.
4112. Paspalum paniculatum.
4113. Panicum boliviense.
4114. Setaria paniculifera.
4116. Paspalum plicatulum.
4119. Eragrostis acutiflora.
4122. Thrasya petrosa.
4124. Panicum trichoides.
4125. Paspalum nutans.
4133. Sporobolus ciliatus.
4134. Paspalum multicaule.
4135. Panicum trichanthum.
4137. Panicum zizanioides.
4139. Panicum trichoides.
4144. Trachypogon montufari.
4145. Andropogon semiberbis.
4146. Anthephora hermaphrodita.
4148. Panicum fasciculatum.
4149. Cenchrus viridis.
4150. Oryza sativa.
4153. Hackelochloa granularis.
4157. Lasiacis ruscifolia.
4158. Setaria tenax.
4163. Panicum rudgei.
4165. Panicum hirsutum.
4166. Eragrostis tephrosanthos.
4167. Hymenachne amplexicaulis.
4170. Isachne polygonoides.
4175. Andropogon saccharoides.
4180. Oplismenus burmanni.
4181. Eragrostis amabilis.
4182. Leptochloa filiformis.
4183. Panicum haenkeanum.
4184. Ischaemum rugosum.
4185. Panicum trichanthum.
4186. Lasiacis sorghoidea.
4188. Sporobolus ciliatus.
4189. Isachne polygonoides.
4190. Panicum trichoides.
4191. Oplismenus burmanni.
4194. Aristida jorullensis.
4195. Trachypogon montufari.
4196. Homolepis aturensis.
4197. Aristida torta.
4198. Oryza sativa.
4199. Eragrostis maypurensis.
4202. Panicum trichanthum.
4203. Aristida capillacea.
4205. Setaria paniculifera.
4206. Oplismenus hirtellus.

KILLIP, E. P.—Continued

4207. Panicum trichoides.
4208. Ichnanthus tenuis.
4210. Sacciolepis myuros.
4213. Sorghastrum incompletum.
4214. Muhlenbergia tenuissima.
4215. Bouteloua pilosa.
4216. Panicum trichoides.
4217. Bouteloua americana.
4218. Andropogon leucostachyus.
4219. Andropogon condensatus.
4220. Aristida recurvata.
4222. Lasiacis oaxacensis.
4223. Orthoclada laxa.
4224. Sorghastrum incompletum.
4225. Andropogon angustatus.
4226. Eragrostis maypurensis.
4227. Eragrostis acutiflora.
4228. Eriochloa distachya.
4231. Paspalum repens.
4232. Panicum fasciculatum.
4237. Panicum haenkeanum.
4239. Panicum pulchellum.
4240. Digitaria horizontalis.
4242. Arundinella deppeana.
4243. Sacciolepis myuros.
4244. Oplismenus burmanni.
4246. Andropogon angustatus.
4250. Leptochloa virgata.
4251. Setaria geniculata.
4253. Eleusine indica.
4254. Orthoclada laxa.
4255. Digitaria sanguinalis.
4256. Panicum haenkeanum.
4257. Andropogon brevifolius.
4258. Trachypogon montufari.
4259. Aristida capillacea.
4260. Paspalum parviflorum.
4261. Arundinella berteroniana.
4263. Lasiacis oaxacensis.
4268. Ischaemum rugosum.
4269. Aristida jorullensis.
4270. Eragrostis maypurensis.
4272. Panicum pilosum.
4273. Eragrostis simpliciflora.
4280. Paspalum plicatulum.
4282. Panicum haenkeanum.
4283. Panicum trichanthum.
4284. Lasiacis oaxacensis.
4285. Orthoclada laxa.
4288. Panicum trichanthum.
4292. Panicum geminatum.

KILLIP, E. P.—Continued

4293. Imperata contracta.
4295. Eragrostis cilaris.
4296. Chloris radiata.
4297. Eragrostis tephrosanthos.
4299. Eragrostis tephrosanthos.
4301. Panicum barbinode.
4303. Panicum trichanthum.
4304. Anthephora hermaphrodita.
4306. Lasiacis oaxacensis.
4309. Panicum haenkeanum.
4310. Arundinella deppeana.
4311. Lasiacis ruscifolia.
4316. Panicum polygonatum.
4324. Sorghum vulgare sudanensis.
4326. Panicum hirticaule.
4329. Paspalum paniculatum.
4343. Leptocoryphium lanatum.
4344. Sporobolus cubensis.
4346. Panicum stenodoides.
4352. Panicum fasciculatum.
4354. Panicum frondescens.
4356. Paspalum virgatum.
4504. Eleusine indica.
4506. Eragrostis tephrosanthos.
4508. Arundinella deppeana.
4509. Andropogon condensatus.
4510. Paspalum candidum.
4513. Muhlenbergia setarioides.
4514. Aegopogon cenchroides.
4515. Polypogon elongatus.
4520. Hyparrhenia bracteata.
4521. Arundinella hispida.
4522. Paspalum humboldtianum.
4525. Ichnanthus nemorosus.
4525a. Panicum olivaceum.
4526. Panicum olivaceum.
4529. Lasiacis oaxacensis.
4544. Lasiacis sorgholdea.
4545. Andropogon hirtiflorus.
4547. Cinna poaeformis.
4548. Agrostis tolucensis.
4550. Festuca dolichophylla.
4551. Aegopogon cenchroides.
4555. Paspalum heterotrichon.
4556. Panicum olivaceum.
4557. Aegopogon cenchroides.
4558. Paspalum pilosum.
4560. Panicum olivaceum.
4561. Panicum pantrichum.
4563. Panicum olivaceum.
4564. Setaria tenacissima.

KILLIP, E. P.—Continued

4565. Panicum viscidellum.
4567. Andropogon glomeratus.
4571. Isachne polygonoides.
4578. Andropogon leucostachyus.
4580. Eriochrysis cayennensis.
4582. Paspalum minus.
4584. Arundinella hispida.
4588. Aristida capillacea.
12011. Lasiacis ruscifolia.
12018. Uniola pittieri.
12033. Sporobolus ciliatus.
12066. Lasiacis procerrima.
12088. Andropogon bicornis.
12108. Andropogon leucostachyus.
12125. Paspalum fasciculatum.
12127. Panicum trichoides.
12130. Panicum pilosum.
12174. Panicum hirsutum.
12176. Echinochloa colonum.

KNEUCKER GRAM. EXS.

743. Pereilema crinitum.

LANKESTER, C. H.

203. Paspalum paniculatum.
205. Panicum virgultorum.
206. Eragrostis mexicana.
210. Sorghum halepense.
211. Panicum glutinosum.
213. Andropogon condensatus.
214. Panicum viscidellum.
215. Sorghum halepense.
676. Epicampes emersleyi.

LEHMANN, F. C.

1290. Cenchrus viridis.
1571. Paspalum distichum.
1577. Aegopogon cenchroides.
1662. Paspalum notatum.
1781. Oplismenus burmanni.
1851. Dactyloctenium aegyptium.

LEVY

8. Gynerium sagittatum.
13. Panicum fasciculatum.
37. Panicum trichoides.
123. Panicum geminatum.
168. Digitaria sanguinalis.
173. Leptochloa filiformis.

LEVY—Continued

197. Eragrostis hypnoides.
229. Dactyloctenium aegyptium.
283. Panicum barbinode.
289. Panicum laxum.
336. Bouteloua pilosa.
362. Hymenachne amplexicaulis.
377. Arundinella deppeana.
385. Aristida ternipes.
391. Aristida jorullensis.
1138. Paspalum microstachyum
1166. Panicum lepidulum.

MACBRIDE, J. F.

2644. Oplismenus hirtellus.
2663. Lasiacis sorghoidea.
2711. Cynodon dactylon.
2735. Panicum pilosum.
2788. Lasiacis ruscifolia.
2806. Oplismenus burmanni.
2837. Axonopus aureus.

MACBRIDE, J. F. & FEATHERSTONE, W.

42. Digitaria sanguinalis.
43. Paspalum paniculatum.
44. Eragrostis ciliaris.

MAXON, W. R.

128. Lasiacis sorghoidea.
3153. Panicum pulchellum.
3154. Oplismenus hirtellus.
3337. Andropogon bicornis.
3466. Eleusine indica.
3476. Panicum barbinode.
3524. Andropogon bicornis.
3526. Arundinella deppeana.
3527. Paspalum adoperiens.
3645. Andropogon glomeratus.
3731. Zeugites munroana.
4653. Lasiacis oaxacensis.
4654. Ichnanthus pallens.
4678. Orthoclada laxa.
4688. Oplismenus burmanni.
4700. Orthoclada laxa.
4703. Panicum trichanthum.
4734. Setaria vulpiseta.
4769. Andropogon bicornis.
4999. Lasiacis oaxacensis.
5006. Pseudechinolaena polystachya.
5136. Panicum olivaceum.
5209. Andropogon bicornis.

MAXON, W. R.—Continued

5234. Polypogon elongatus.
5266. Lasiacis oaxacensis.
5358. Agrostis tolucensis.
5358A. Aegopogon cenchroides.
5665. Chusquea serrulata.
6514. Paspalum plicatulum.
6516. Paspalum conjugatum.
6517. Panicum pilosum.
6557. Chusquea simpliciflora.
6580. Olyra latifolia.
6690. Ichnanthus pallens.
6781. Panicum maximum.
6824. Streptochaeta sodiroana.
6837. Cenchrus echinatus.
6844. Digitaria horizontalis.
6846. Cenchrus viridis.
6851. Chloris inflata.
6864. Andropogon leucostachyus.
6865. Andropogon bicornis.
6896. Streptochaeta sodiroana.
7021. Trichachne insularis.
7031. Homolepis aturensis.
7052. Ichnanthus pallens.
7069. Panicum frondescens.
7077. Ichnanthus tenuis.
7143. Paspalum paniculatum.
7148. Cynodon dactylon.
7173. Eragrostis ciliaris.
7175. Oplismenus burmanni.
7177. Panicum fasiculatum.
7190. Olyra latifolia.
7203. Panicum trichoides.
7207. Leptochloa filiformis.
7252. Panicum fasciculatum.
7257. Paspalum vaginatum.
7261. Cenchrus pilosus.
7296. Eragrostis hypnoides.
7298. Panicum geminatum.
7308. Panicum molle.
7337. Paspalum vaginatum.
7351. Leptochloa filiformis.
7408. Lasiacis divaricata.
7440. Pennisetum complanatum.
7514. Lasiacis sorghoidea.
7528. Ichnanthus nemorosus.
7546. Lasiacis ruscifolia.
7606. Eleusine indica.
7611. Olyra latifolia.
7629. Panicum hirticaule.
7631. Panicum molle.
7632. Aristida ternipes.

MAXON, W. R.—Continued

7633. Panicum hirticaule.
7643. Olyra latifolia.
7679. Eragrostis tephrosanthos.
7793. Setaria paniculifera.
7845. Cenchrus viridis.
7846. Dactyloctenium aegyptium.
7856. Eleusine indica.
7998. Lasiacis sorghoidea.
8025. Lasiacis sorghoidea.
8050. Lasiacis sorghoidea.
8154. Arthrostylidium maxoni.
8298. Ichnanthus tenuis.
8500a. Aegopogon cenchroides.

MILLER, W. DE W., & GRISCOM, L.

131. Panicum joorii.
132. Panicum angustifolium.
132a. Panicum viscidellum.
133. Panicum angustifolium.
134. Panicum xalapense.
134a. Panicum joorii.
135. Panicum xalapense.
136. Panicum joorii.
137. Panicum pulchellum.
138. Panicum sphaerocarpon.
139. Oplismenus hirtellus.
140. Arundinella deppeana.
141. Ischaemum latifolium.
142. Sporobolus elongatus.
143. Paspalum squamulatum.
144. Paspalum squamulatum.

OERSTED

65. Andropogon brevifolius.
66. Andropogon brevifolius.
68. Andropogon brevifolius.
5922. Hyparrhenia bracteata.
5932. Heteropogon contortus.
5933. Heteropogon contortus.
5934. Heteropogon contortus.
6106. Erichloa punctata.
6123. Imperata brasiliensis.
6127. Ischaemum latifolium.
6229. Trachypogon montufari.
14008. Paspalum saccharoides.
14107. Paspalum minus.

PADILLA, S. A.

133. Muhlenbergia tenella.
134. Pereilema crinitum.
135. Lasiacis ruscifolia.

PADILLA, S. A.—Continued

266. Cynodon dactylon.
282. Pennisetum bambusiforme.
283. Pennisetum setosum.
288. Arthrostylidium racemiflorum.
306. Cenchrus pauciflorus.
347. Paspalum dilatatum.
358. Sorghum vulgare.
391. Paspalum centrale.
393. Paspalum crassum.
400. Paspalum plicatulum.
404. Axonopus aureus.
594. Paspalum langei.
595. Eragrostis simpliciflora.

PECK, M. E.

71. Paspalum peckii.
136. Mesosetum filifolium.
281a. Eragrostis acutiflora.

PIPER, C. V.

5197. Axonopus compressus.
5198. Paspalum plicatulum.
5198½. Paspalum plicatulum.
5199. Paspalum virgatum.
5201. Paspalum paniculatum.
5203. Paspalum virgatum.
5204. Paspalum paniculatum.
5205. Paspalum repens.
5206. Paspalum plicatulum.
5207. Paspalum paniculatum.
5208. Paspalum paniculatum.
5210. Axonopus purpusii.
5211. Axonopus compressus.
5212. Axonopus compressus.
5213. Axonopus compressus.
5214. Axonopus compressus.
5215. Paspalum fasciculatum.
5217. Sporobolus indicus.
5218. Orthoclada laxa.
5219. Lasiacis sorghoidea.
5220. Arundinella confinis.
5222. Panicum pilosum.
5223. Andropogon bicornis.
5224. Panicum pilosum.
5225. Sporobolus indicus.
5226. Olyra latifolia.
5227. Ichnanthus pallens.
5228. Setaria vulpiseta.
5229. Olyra latifolia.
5230. Setaria geniculata.

PIPER, C. V.—Continued

5231. Phragmites communis.
5232. Eragrostis viscosa.
5233. Panicum fasciculatum.
5234. Anthephora hermaphrodita.
5235. Digitaria sanguinalis.
5236. Panicum fasciculatum.
5237. Panicum trichanthum.
5238. Andropogon bicornis.
5239. Digitaria horizontalis.
Panicum pilosum.
5240. Panicum trichoides.
5241. Panicum grande.
5242. Panicum trichanthum.
5243. Trichachne insularis.
5244. Panicum trichoides.
5245. Diectomis fastigiata.
5246. Aristida jorullensis.
5247. Leersia hexandra.
5248. Panicum trichoides.
5249. Cenchrus viridis.
5250. Andropogon bicornis.
5251. Panicum laxum.
5252. Ichnanthus pallens.
5253. Panicum hirsutum.
5254. Arundinella deppeana.
5255. Chloris inflata.
5256. Panicum barbinode.
5257. Lasiacis ruscifolia.
5258. Panicum pilosum.
5259. Panicum trichoides.
5260. Panicum haenkeanum.
5261. Lasiacis sorghoidea.
5262. Digitaria sanguinalis.
5263. Leptochloa virgata.
5264. Cenchrus viridis.
5265. Andropogon condensatus.
5266. Panicum haenkeanum.
5267. Aristida recurvata.
5268. Homolepis aturensis.
5269. Panicum trichanthum.
5271. Oplismenus hirtellus.
5272. Arundinella berteroniana.
5273. Leptochloa virgata.
5274. Panicum pilosum.
5275. Bouteloua pilosa.
5276. Bouteloua repens.
5277. Jouvea straminea.
5278. Lasiacis oaxacensis.
5279. Andropogon leucostachyus.
5280. Lasiacis procerrima.

PIPER, C. V.—Continued

5281. Panicum pulchellum.
Lasiacis sorghoidea.
Ischaemum ciliare.
5283. Panicum pilosum.
5284. Cenchrus viridis.
5285. Lasiacis sorghoidea.
5287. Andropogon condensatus.
5288. Lasiacis oaxacensis.
5289. Eragrostis ciliaris.
5290. Olyra latifolia.
5291. Chusquea simpliciflora.
5292. Chusquea simpliciflora.
5293. Paspalum minus.
5883. Chloris petraea.
5947. Andropogon condensatus.
5948. Lasiacis procerrima.
5949. Olyra latifolia.

PITTIER, H.

29. Aegopogon cenchroides.
101. Panicum paludivagum.
102. Andropogon saccharoides.
206. Paspalum conjugatum pubescens.
207. Paspalum decumbens.
208. Axonopus compressus.
209. Andropogon condensatus.
214. Axonopus purpusii.
215. Leptocoryphium lanatum.
216. Andropogon leucostachyus.
217. Pennisetum setosum.
218. Andropogon condensatus.
219. Paspalum humboldtianum.
220. Eriochloa distachya.
221. Trachypogon montufari.
248. Homolepis aturensis.
249. Paspalum paniculatum.
250. Paspalum virgatum.
252. Isachne arundinacea.
253. Andropogon leucostachyus.
254. Cenchrus echinatus.
255. Trachypogon montufari.
256. Olyra latifolia.
257. Panicum strigosum.
258. Paspalum caespitosum.
259. Leptocoryphium lanatum.
260. Ischaemum latifolium.
261. Tripsacum latifolium.
312. Hackelochloa granularis.
360. Paspalum dilatatum.

PITTIER, H.—Continued

361. Panicum laxum.
362. Paspalum orbiculatum.
363. Paspalum urvillei.
364. Panicum stoloniferum.
1751. Pennisetum ciliare.
1755. Eragrostis cilianensis.
1756. Eragrostis ciliaris.
1757. Dactyloctenium aegyptium.
1775. Eragrostis hypnoides.
1787. Lasiacis sorghoidea.
1788. Paspalum trachycoleon.
1795. Setaria geniculata.
1800. Panicum strigosum.
1805. Thrasya campylostachya.
1805a. Panicum albomarginatum.
1805b. Panicum arenicoloides.
1806. Thrasya campylostachya.
1806a. Setaria geniculata.
1832a. Paspalum trachycoleon.
1847. Paspalum blodgettii.
1901a. Pennisetum complanatum.
1960. Panicum maximum.
2079. Paspalum virgatum.
2080. Cenchrus viridis.
2081. Leptochloa virgata.
2082. Panicum pilosum.
2083. Panicum trichoides.
2084. Paspalum conjugatum.
2085. Eragrostis ciliaris.
2086. Oplismenus burmanni.
2087. Trichachne insularis.
2088. Panicum maximum.
2114. Eleusine indica.
2117. Panicum fasciculatum.
2118. Lasiacis sorghoidea.
2119. Ichnanthus tenuis.
2120. Chloris inflata.
2121. Setaria vulpiseta.
2166. Cynodon dactylon.
2167. Chloris inflata.
2168. Panicum geminatum.
2169. Panicum haenkeanum.
2170. Panicum geminatum.
2184. Echinochloa colonum.
2185. Digitaria sanguinalis.
2196. Lasiacis sorghoidea.
2226. Panicum puchellum.
2324. Orthoclada laxa.
2327. Sacciolepis myuros.
2335. Ichnanthus pallens.
2339. Olyra latifolia.

PITTIER, H.—Continued

2342. Lasiacis divaricata.
2352. Panicum trichoides.
2381. Paspalum nutans.
2443. Panicum laxum.
2444. Paspalum conjugatum.
2454. Isachne polygonoides.
2478. Panicum fasciculatum.
2479. Eleusine indica.
2480. Paspalum conjugatum.
2481. Panicum pilosum.
2505. Echinochloa colonum.
2506. Ischaemum rugosum.
2508. Echinochloa crusgalli crus-pavonis.
2509. Panicum geminatum.
2537. Bouteloua pilosa.
2544. Muhlenbergia tenuissima
2545. Andropogon brevifolius.
2559. Panicum barbinode.
2596. Sorghum halepense.
2598. Dactyloctenium aegyptium
2615. Orthoclada laxa.
2635. Homolepis aturensis.
2636. Panicum haenkeanum.
2650. Digitaria sanguinalis.
2682. Orthoclada laxa.
2686. Olyra latifolia.
2695. Paspalum pectinatum.
3041. Paspalum paniculatum.
3042. Setaria geniculata.
3043. Panicum viscidellum.
3069. Chusquea subtessellata.
3085. Chusquea serrulata.
3097. Aegopogon cenchroides.
3101. Agrostis tolucensis.
3103. Agrostis tolucensis.
3315. Aristida capillacea.
3324. Andropogon leucostachyus.
3426. Paspalum orbiculatum.
3434. Sporobolus indicus.
3435. Paspalum conjugatum.
3436. Paspalum conjugatum.
3439. Sporobolus indicus.
3440. Leptochloa virgata.
3441. Panicum hirsutum.
3462. Axonopus compressus.
3463. Setaria scandens.
3470. Olyra latifolia.
3478. Paspalum coryphaeum.
3564. Leptochloa filiformis.
3565. Axonopus poiophyllus.

PITTIER, H.—Continued

3582. Axonopus polophyllus.
3584. Paspalum pectinatum.
3603. Lasiacis ruscifolia.
3604. Paspalum virgatum.
3622. Paspalum plicatulum.
3626. Panicum fasciculatum.
3714. Panicum geminatum.
3715. Cenchrus echinatus.
3716. Cenchrus viridis.
3717. Dactyloctenium aegyptium.
3718. Panicum fasciculatum.
3719. Setaria geniculata.
3720. Echinochloa colonum.
3721. Chloris inflata.
3722. Paspalum paniculatum.
3723. Echinochloa colonum.
3724. Paspalum virgatum.
3725. Paspalum plicatulum.
3726. Panicum megiston.
3727. Homolepis aturensis.
3742. Axonopus compressus.
3743. Panicum fasciculatum.
3744. Setaria vulpiseta.
3745. Paspalum saccharoides.
3759. Olyra latifolia.
3760. Eleusine indica.
3761. Digitaria sanguinalis.
3762. Anthephora hermaphrodita.
3780. Coix lacryma-jobi.
3781. Panicum zizanioides.
3813. Cynodon dactylon.
3824. Panicum trichanthum.
3944. Chloris petraea.
3966. Imperata contracta.
3967. Andropogon bicornis.
3975. Hackelochloa granularis.
4020. Paspalum fasciculatum.
4026. Panicum zizanioides.
4027. Panicum frondescens.
4064. Sporobolus indicus.
4071. Uniola pittieri.
4075. Pariana zingiberina.
4088. Pharus latifolius.
4115. Stenotaphrum secundatum.
4125. Anthephora hermaphrodita.
4126. Olyra latifolia.
4133. Chloris petraea.
4135. Chloris petraea.
4136. Leptochloa virgata.
4146. Eragrostis hypnoides.
4147. Paspalum orbiculatum.

PITTIER, H.—Continued

4151. Olyra latifolia.
4231. Paspalum paniculatum.
4232. Paspalum vaginatum.
4233. Sporobolus littoralis.
4259. Stenotaphrum secundatum.
4260. Paspalum conjugatum.
4261. Paspalum vaginatum.
4284. Panicum trichoides.
4314. Paspalum conjugatum.
4332. Setaria vulpiseta.
4349. Ctenium planifolium.
4350. Aristida implexa.
4351. Paspalum pectinatum.
4367. Oryza sativa.
4371. Panicum pilosum.
4374. Panicum hirsutum.
4375. Panicum fasciculatum.
4383. Echinochloa polystachya.
4435. Paspalum fasciculatum.
4436. Paspalum microstachyum.
4440. Digitaria sanguinalis.
4444. Setaria geniculata.
4452. Axonopus compressus.
4453. Diectomis fastigiata.
Paspalum notatum.
4461. Dactyloctenium aegyptium.
4462. Paspalum microstachyum.
4463. Paspalum stellatum.
4464. Digitaria sanguinalis.
4494. Paspalum plicatulum.
4500. Paspalum subciliatum.
4515. Paspalum multicaule.
4524. Eragrostis acutiflora.
4525. Paspalum clavuliferum.
4526. Panicum lepidulum.
4527. Paspalum centrale.
4531. Isachne polygonoides.
4534. Axonopus compressus.
4536. Panicum pilosum.
4551. Paspalum plicatulum.
4552. Leersia hexandra.
4613. Paspalum orbiculatum.
4614. Panicum chloroticum.
4615. Panicum laxum.
4621. Paspalum centrale.
4622. Paspalum multicaule.
4624. Paspalum minus.
4632. Paspalum hitchcockii.
4634. Axonopus compressus.
4642. Aristida jorullensis.
4646. Paspalum densum.

PITTIER, H.—Continued

4647. Paspalum virgatum.
4648. Paspalum plicatulum.
4649. Rottboellia aurita.
4688. Lasiacis ruscifolia.
4693. Digitaria horizontalis.
Paspalum virgatum.
4694. Eleusine indica.
4695. Panicum fasciculatum.
4696. Panicum trichoides.
4719. Paspalum nutans.
4734. Panicum barbinode.
4742. Paspalum plicatulum.
4751. Mesosetum pittieri,
4753. Aristida jorullensis.
4768. Eragrostis maypurensis.
4777. Coix lacryma-jobi.
4789. Panicum laxum.
4790. Panicum zazanioides.
4792. Setaria geniculata.
4798. Panicum trichanthum.
4806. Panicum maximum.
4807. Panicum barbinode.
4838. Eragrostis simpliciflora.
4849. Diectomis fastigiata.
4850. Aristida jorullensis.
4851. Eragrostis maypurensis.
4859. Digitaria argillacea.
4864. Eragrostis maypurensis.
4865. Sporobolus ciliatus.
4866. Paspalum multicaule.
4868. Andropogon brevifolius.
4871. Paspalum multicaule.
4872. Axonopus compressus.
4873. Bouteloua repens.
4877. Diectomis fastigiata.
4883. Andropogon angustatus.
4887. Oplismenus burmanni.
4891. Eragrostis acutiflora.
4892. Oryza sativa.
4900. Eragrostis simpliciflora.
4908. Hymenachne amplexicaulis.
4909. Leersia hexandra.
4910. Diectomis fastigiata.
4914. Paspalum plicatulum.
4916. Sacciolepis myuros.
4917. Isachne polygonoides.
4920. Sacciolepis myuros.
4930. Eragrostis acutiflora.
4931. Axonopus compressus.
4959. Paspalum convexum.
4972. Dactyloctenium aegyptium.

PITTIER, H.—Continued

4973. Eleusine indica.
4987. Lasiacis ruscifolia.
4996. Bouteloua pilosa.
4998. Lasiacis ruscifolia.
5018. Diectomis fastigiata.
5020. Paspalum stellatum.
5021. Axonopus appendiculatus.
5037. Sorghastrum incompletum.
5042. Epicampes emersleyi.
5043. Eriochloa distachya.
5046. Pereilema crinitum.
5051. Elyonurus tripsacoides.
5052. Axonopus appendiculatus.
5054. Andropogon brevifolius.
5055. Gymnopogon fastig atus.
5062. Epicampes emersleyi.
5063. Paspalum contractum.
5064. Paspalum stellatum.
5065. Ctenium planifolium.
5068. Hackelochloa granularis.
5071. Hyparrhenia bracteata.
5149. Paspalum multicaule.
5164. Streptochaeta sodiroana.
5164½. Streptochaeta spicata.
5184. Eragrostis maypurensis.
5185. Paspalum decumbens.
5194. Aristida capillacea.
5195. Sporobolus ciliatus.
5203. Ichnanthus axillaris.
5204. Ichnanthus pallens.
5205. Oplismenus burmanni.
5206. Olyra latifolia.
5220. Orthoclada laxa.
5227. Sorghastrum incompletum.
5230. Ichnanthus pallens.
5231. Sorghastrum nutans.
5232. Axonopus aureus.
5234. Panicum laxum.
5247. Panicum haenkeanum.
5259. Diectomis fastigiata.
5272. Ichnanthus pallens.
5308. Muhlenbergia tenella.
5325. Paspalum pilosum.
5331. Lasiacis sorghoidea.
5339. Lasiacis sorghoidea.
5344. Setaria geniculata.
5345. Paspalum minus.
5348. Andropogon leucostachyus.
5360. Epicampes emersleyi.
5361. Andropogon tener.
5362. Epicampes emersleyi.

PITTIER, H.—Continued

5363. Thrasya villosa.
5364. Paspalum pilosum.
5365. Thrasya campylostachya.
5366. Ichnanthus tenuis.
5367. Axonopus aureus.
5369. Axonopus scoparius.
5370. Ichnanthus tenuis.
5375. Panicum pulchellum.
5385. Sorghastrum incompletum.
5416. Panicum pyrularium.
5422. Lasiacis oaxacensis.
5527. Leptochloa virgata.
5528. Oryza latifolia.
5529. Eriochloa punctata.
5530. Hymenachne amplexicaulis.
5546. Panicum grande.
5744. Pharus latifolius.
5745. Uniola pittieri.
5752. Paspalum decumbens.
5753. Paspalum nutans.
5947. Andropogon condensatus.
6200. Setaria paniculifera.
6576. Panicum polygonatum.
6643. Olyra latifolia.
6717. Panicum megiston.
6718. Hackelochloa granularis.
6719. Panicum fasciculatum.
6729. Dactyloctenium aegyptium.
6730. Panicum pilosum.
6731. Paspalum plicatulum.
6732. Sporobolus indicus.
6733. Eleusine indica.
6750. Panicum pilosum.
6758. Dactyloctenium aegyptium.
6759. Setaria geniculata.
6760. Paspalum centrale.
6761. Panicum trichoides.
6763. Paspalum plicatulum.
6767. Paspalum paniculatum.
6768. Paspalum virgatum.
6770. Echinochloa colonum.
6774. Lasiacis procerrima.
6779. Paspalum centrale.
6780. Eragrostis acutiflora.
6789. Paspalum microstachyum.
6790. Cenchrus viridis.
6791. Oryza latifolia.
6808. Paspalum repens.
6817. Paspalum centrale.
6822. Oplismenus burmanni.
6831. Ischaemum rugosum.

PITTIER, H.—Continued

6837. Echinochloa colonum.
6840. Setaria geniculata.
6841. Paspalum fasciculatum.
6842. Eragrostis limbata.
6850. Setaria vulpiseta.
6853. Digitaria sanguinalis.
6854. Panicum trichoides.
6855. Leptochloa filiformis.
6856. Panicum pilosum.
6865. Bouteloua repens.
6889. Eragrostis maypurensis.
6892. Lasiacis ruscifolia.
6902. Panicum fasciculatum.
6903. Leptochloa filiformis.
6918. Muhlenbergia tenuissima.
6919. Eragrostis maypurensis.
6920. Eragrostis acutiflora.
6921. Panicum fasciculatum.
6923. Ichnanthus pallens.
6924. Lasiacis sorghoidea.
6941. Pharus latifolius.
6943. Panicum hirsutum.
6945. Panicum trichanthum.
8557. Panicum trichoides.
8564. Panicum polygonatum.
8581. Paspalum decumbens.
8601. Setaria geniculata.
8604. Eragrostis maypurensis.
8605. Paspalum conjugatum.
8609. Digitaria sanguinalis.
8619. Panicum laxum.

POPENOE, D. H.

2. Ichnanthus tenuis.
6. Ichnanthus pallens.
10. Setaria vulpiseta.
13. Paspalum virgatum.
19. Ischaemum rugosum.
20. Imperata contracta.
20½. Panicum pulchellum.
23. Axonopus compressus.
24. Andropogon brevifolius.
25. Setaria paniculifera.
26. Lasiacis sorghoidea.
27. Ischaemum ciliare.
28. Bouteloua pilosa.
35. Panicum boliviense.
36. Paspalum repens.
38. Panicum grande.
39. Pharus glaber.
44. Andropogon glomeratus.

POPENOE, D. H.—Continued

45. Hymenachne amplexicaulis.
46. Phragmites communis.
47. Lasiacis sorghoidea.
54. Paspalum microstachyum.
61. Aristida ternipes.

POPENOE, WILSON

661. Chloris virgata.
662. Eleusine indica.
663. Chloris orthonoton.
665. Cynodon dactylon.
666. Sporobolus elongatus.
667. Hilaria cenchroides.
668. Setaria geniculata.
669. Elyonurus tripsacoides ciliaris.
669a. Andropogon saccharoides.
670. Paspalum lividum.
693. Diectomis fastigiata.
693a. Andropogon brevifolius.
693b. Aristida arizonica.
694. Eragrostis maypurensis.
695. Eragrostis ciliaris.
696. Paspalum notatum.
697. Diectomis fastigiata.
698. Sporobolus elongatus.
699. Andropogon saccharoides laguroides.
700. Aristida ternipes.
702. Oplismenus burmanni.
710. Aristida jorullensis.
711. Bouteloua repens.
711a. Digitaria argillacea.
712. Eragrostis maypurensis.
730. Aegopogon cenchroides.
732. Sorghastrum incompletum.
733. Pereilema crinitum.
734. Pennisetum complanatum.
735. Lasiacis oaxacensis.
735a. Tricholaena rosea.
736. Muhlenbergia implicata.
737. Lasiacis procerrima.
738. Epicampes stricta.
885. Panicum polygonatum.
887. Axonopus compressus.
888. Axonopus compressus.
890. Setaria geniculata.
891. Digitaria horizontalis.
892. Axonopus compressus.
893. Paspalum conjugatum.
894. Paspalum paniculatum.

POPENOE, WILSON—Continued

898. Oplismenus burmanni.
899. Paspalum plicatulum.
900. Sporobolus elongatus.
901. Paspalum conjugatum pubescens.
903. Pereilema crinitum.
904. Panicum sphaerocarpon.
905. Setaria geniculata.
906. Paspalum paniculatum.
907. Andropogon glomeratus.
908. Setaria paniculifera.
909. Paspalum fasiculatum.
910. Pennisetum distachyum.
911. Pennisetum complanatum.
912. Melinis minutiflora.
913. Paspalum candidum.
914. Agrostis perennans.
915. Arundinella deppeana.
942. Trichachne insularis.
976. Guadua aculeata.

RENSON, CARLOS.

63. Oplismenus hirtellus.
169. Cenchrus echinatus.
207. Arundinella deppeana.
214. Panicum barbinode.
278. Cynodon dactylon.
285. Andropogon bicornis.
293. Panicum maximum.
296. Setaria vulpiseta.
301. Ixophorus unisetus.
320. Eragrostis limbata.
323. Lasiacis divaricata.
324. Pennisetum setosum.
330. Sporobolus elongatus.
353. Paspalum notatum.
362. Ixophorus unisetus.

ROJAS.

37. Paspalum notatum.
58. Aristida schiedeana.
74. Chaetium bromoides.
99. Ixophorus unisetus.
104. Paspalum squamulatum.
105. Paspalum humboldtianum.
106. Echinochloa crusgalli crus-pavonis.
117. Pseudechinolaena polystachya.
120. Eragrostis tephrosanthos.
168. Uniola pittieri.

ROJAS—Continued

377. Arundinella deppeana.
380. Muhlenbergia tenella.
381. Chaetium bromoides.
382. Aegopogon cenchroides.
383. Agrostis verticillata.
385. Pereilema crinitum.
386. Sorghum vulgare.
388. Tricholaena rosea.
558. Andropogon bicornis.
559. Eragrostis tephrosanthos.
560. Pseudechinolaena polystachya.
561. Arundinella berteroniana.
562. Setaria geniculata.
563. Axonopus compressus.

ROSE, J. N.

22062. Sporobolus indicus.
22063. Chloris inflata.
22068. Eragrostis ciliaris.
22075. Paspalum paniculatum.
22081. Eragrostis amabilis.
22082. Cenchrus viridis.
22083. Eleusine indica.
23993. Eragrostis amabilis.
23994. Eragrostis tephrosanthos.

ROWLEE, W. W.

12. Sporobolus elongatus.
128. Eragrostis limbata.
131. Tricholaena rosea.
332. Arundinella berteroniana.
416. Leptochloa virgata.
458. Sporobolus indicus.
459. Cynodon dactylon.
461. Sorghum vulgare sudanense.
463. Chloris radiata.
467. Imperata contracta.
633. Pharus latifolius.
643. Homolepis aturensis.
644. Pharus latifolius.
829. Setaria paniculifera.
878. Festuca amplissima.
882. Chusquea serrulata.
945. Lasiacis procerrima.

SELER, C. AND E.

2298. Oplismenus burmanni.
2301. Pennisetum complanatum.
2360. Oplismenus burmanni.
Poa seleri.

SELER, C. AND E.—Continued

2404. Sorghum vulgare.
2405. Lasiacis procerrima.
2422. Pennisetum bambusiforme.
2442. Paspalum humboldtianum.
2446. Lasiacis ruscifolia.
2463. Eragrostis ciliaris,
2464. Eragrostis limbata.
2465. Eragrostis tephrosanthos.
2468. Hilaria cenchroides.
2539. Lamarckia aurea.
2561. Pseudechinolaena polystachya.
2576. Paspalum conjugatum.
2701. Tripsacum dactyloides.
2703. Epicampus macroura.
2704. Panicum fasciculatum.
2705. Eleusine indica.
2707. Paspalum costaricense.
2708. Panicum virgultorum.
2711. Eragrostis limbata.
2715. Paspalum paniculatum.
2716. Setaria vulpiseta.
2718. Heteropogon contortus.
2719. Andropogon saccharoides.
2720. Hyparrhenia ruprechtii.
2723. Tripsacum pilosum.
3004. Lasiacis divaricata.
3028. Pentarrhaphis scabra.
3231. Chaetium bromoides.
3233. Digitaria velutina.
3235. Panicum olivaceum.
3265. Sporobolus ramulosus.
3354. Pseudechinolaena polystachya.

SHANNON, W. C.

324. Calamagrostis junciformis.
3672. Oplismenus burmanni.
3673. Pereilema crinitum.
3674. Diectomis fastigiata.
3675. Agrostis tolucensis.
3699. Muhlenbergia diversiglumis.

SMITH, C. L.

1075. Oplismenus burmanni.

SMITH, J. D.

1852. Lasiacis sorghoidea.
1853. Pennisetum bambusiforme.
1854. Isachne arundinacea.
2232. Trichachne insularis.

SMITH, J. D.—Continued

2233. Panicum fasciculatum.
2702. Agrostis verticillata.
2703. Polypogon elongatus.
2704. Trichachne insularis.
2705. Panicum maximum.
2706. Panicum maximum.
2707. Aegopogon tenellus.
2708. Aegopogon cenchroides.
4891. Lasiacis sorghoidea.
4991. Lasiacis sorghoidea.
4992. Paspalum candidum.
6848. Pharus cornutus.

STANDLEY, PAUL C.[10]

19121. Arundinella deppeana.
19136. Lasiacis divaricata.
19158. Oplismenus burmanni.
19169. Diectomis fastigiata.
19171. Andropogon brevifolius.
19172. Hackelochloa granularis.
19217. Eragrostis tephrosanthos.
19234. Chloris virgata.
19239. Leptochloa filiformis
19241. Chloris radiata.
19245. Eragrostis ciliaris.
19256. Muhlenbergia tenella.
19262. Pereilema crinitum.
19269. Aristida ternipes.
19285. Sporobolus elongatus.
19298. Ixophorus unisetus.
19304. Cenchrus viridis.
19305. Eragrostis glomerata.
19306a. Anthephora hermaphrodita.
19336. Coix lacryma-jobi.
19344. Ixophorus unisetus.
19363. Eragrostis amabilis.
19369. Eragrostis tephrosanthos.
19379. Cynodon dactylon.
19393. Aristida jorullensis.
19394. Diectomis fastigiata.
19413. Axonopus compressus.
19421. Lasiacis ruscifolia.
19437. Lasiacis ruscifolia.
19453. Bouteloua repens.
19488. Chusquea simpliciflora.
19527. Panicum trichoides.
19545. Panicum barbinode.
19546. Eragrostis cilianensis.

STANDLEY, PAUL C.—Continued

19549. Sorghum vulgare.
19554. Bouteloua curtipendula.
19555. Pennisetum complanatum.
19557. Anthephora hermaphrodita.
19558. Paspalum plicatum.
19652. Digitaria sanguinalis.
19653. Digitaria sanguinalis.
19663. Tricholaena rosea.
19713b. Cymbopogon citratus.
19715. Oplismenus burmanni.
19751a. Aristida ternipes.
19787. Paspalum candidum.
19824. Panicum laxum.
19825. Paspalum conjugatum.
19826. Hyparrhenia rufa.
19870. Lasiacis ruscifolia.
19878. Lasiacis divaricata.
19955. Arthrostylidium racemiflorum.
20063. Arthrostylidium racemiflorum.
20070. Pharus glaber.
20109. Lasiacis ruscifolia.
20248. Panicum trichoides.
20263. Eragrostis limbata.
20316. Thrasya campylostachya.
20377. Axonopus aureus.
20388. Hyparrhenia ruprechtii.
20451. Axonopus compressus.
20456. Panicum molle.
20457. Eragrostis limbata.
20459. Cenchrus viridis.
20461. Bambusa vulgaris.
20495. Paspalum paniculatum.
20496. Paspalum plicatulum.
20512. Lasiacis procerrima.
20519. Pennisetum setosum.
20521. Sporobolus elongatus.
20530. Sorghum vulgare sudanense.
20569. Leptochloa virgata.
20574. Sporobolus elongatus.
20575. Setaria geniculata.
20577. Panicum maximum.
20583. Dactyloctenium aegyptium.
20610. Eragrostis cilianensis.
20660. Lasiacis ruscifolia.
20768. Leptochloa filiformis.
20790. Jouvea straminea.
20791. Sporobolus argutus.
20810. Olyra latifolia.
20867. Hyparrhenia rufa.
20875. Cenchrus viridis.
20876. Trichachne insularis.

[10] Some collected with Valerio and some with Torres.

STANDLEY, PAUL C.—Continued

20884. Sorghum vulgare.
20917. Dactyloctenium aegyptium
20960. Leptochloa virgata.
20965. Oryza latifolia.
20973. Gouinia virgata.
20985. Eragrostis hypnoides.
21067. Paspalum paniculatum.
21071. Anthephora hermaphrodita.
21085. Axonopus compressus.
21086. Paspalum microstachyum.
21087. Panicum fasciculatum.
21095. Panicum barbinode.
21101. Oryza latifolia.
21105. Leptochloa virgata.
21107. Panicum laxum.
21108. Paspalum orbiculatum.
21118. Leptochloa virgata.
21138. Lasiacis ruscifolia.
21163. Panicum trichoides.
21178. Leptochloa scabra.
21184. Eragrostis limbata.
21208. Muhlenbergia tenella.
21234. Eleusine indica.
21255. Pennisetum ciliare.
21256. Bouteloua curtipendula.
21298. Digitaria sanguinalis.
21302. Axonopus compressus.
21312. Eragrostis tephrosanthos.
21319. Eragrostis limbata.
21320. Setaria geniculata.
21322. Dactyloctenium aegyptium.
21365. Rottboellia fasciculata.
21387. Aristida ternipes.
21430. Hymenachne amplexicaulis.
21430a. Panicum laxum.
21479. Setaria geniculata.
21482. Paspalum costaricense.
21493. Paspalum costaricense.
21494. Panicum virgultorum.
21508. Lasiacis sorghoidea.
21532. Chaetium bromoides.
21624. Pennisetum setosum.
21635. Cenchrus viridis.
21691. Olyra latifolia.
21715. Setaria geniculata.
21716. Paspalum paniculatum.
21754. Arundinella deppeana.
21782. Arundinella berteroniana.
21783. Muhlenbergia tenella.
21784. Eragrostis ciliaris.
21851. Axonopus compressus.

STANDLEY, PAUL C.—Continued

21891. Jouvea pilosa.
21908. Chloris radiata.
22021. Chloris radiata.
22027. Panicum laxum.
22039. Oryza latifolia.
22061. Panicum fasciculatum.
22062. Leptochloa filiformis.
22062a. Leptochloa virgata.
22077. Paspalum paniculatum.
22078. Cenchrus viridis.
22083. Trichachne insularis.
22104. Coix lacryma-jobi.
22105. Panicum maximum.
22111. Eragrostis ciliaris.
22111a. Eragrostis limbata.
22127. Cynodon dactylon.
22133. Panicum fasciculatum.
22134. Ixophorus unisetus.
22138. Panicum laxum.
22202. Panicum trichoides.
22242. Paspalum paniculatum.
22243. Oplismenus burmanni.
22247. Oryza latifolia.
22264. Eragrostis cilianensis.
22274. Cenchrus pilosus.
22279. Sorghum halepense.
22287. Paspalum microstachyum.
22290. Brachiaria plantaginea.
22293. Digitaria sanguinalis.
22355. Olyra latifolia.
22356. Panicum fasciculatum.
22367. Leptochloa filiformis.
22410. Muhlenbergia tenella.
22428. Hackelochloa granularis.
22430. Panicum fasciculatum.
22441. Paspalum adoperiens.
22442. Paspalum paniculatum.
22465. Lasiacis ruscifolia.
22482. Panicum barbinode.
22485. Eragrostis viscosa.
22486. Paspalum plicatulum.
22487. Paspalum paniculatum.
22496. Eragrostis ciliaris.
22507. Cenchrus echinatus.
22524. Pennisetum ciliare.
22540. Tricholaena rosea.
22541. Trichachne insularis.
22556. Eragrostis cilianensis.
22628. Melinis minutiflora.
22630. Eleusine indica.
22631. Tripsacum laxum.

STANDLEY, PAUL C.—Continued

22633. Arthrostylidium racemiflorum.
22634. Hyparrhenia rufa.
22775. Arundinella deppeana.
22786. Sporobolus elongatus.
22788. Andropogon bicornis.
22793. Paspalum paniculatum.
22823. Tricholaena rosea.
22824. Paspalum costaricense.
22832. Eragrostis limbata.
22836. Setaria geniculata.
22860. Phalaris arundinacea picta.
22874. Paspalum costaricense.
22879. Chaetium bromoides.
22880. Sporobolus elongatus.
22896. Oplismenus hirtellus.
22896a. Ichnanthus nemorosus.
22938. Pennisetum bambusiforme.
22945. Panicum pulchellum.
22951. Pennisetum complanatum.
23062. Arundinella deppeana.
23086. Chloris radiata.
23090. Paspalum paniculatum.
23091. Paspalum plicatulum.
23110. Eragrostis limbata.
23117. Lasiacis sorghoidea.
23130. Sorghum halepense.
23155. Dactyloctenium aegyptium.
23170. Ichnanthus nemorosus.
23182. Arundinella deppeana.
23187. Panicum trichoides.
23194. Anthephora hermaphrodita.
23199. Olyra latifolia.
23233. Trichachne insularis.
23235. Jouvea pilosa.
23271. Paspalum adoperiens.
23285. Paspalum adoperiens.
23289. Eragrostis glomerata.
23293. Oplismenus burmanni.
23298. Panicum trichanthum.
23308. Axonopus compressus.
23341. Eragrostis tephrosanthos.
23342. Eragrostis cilianensis.
23343. Chloris radiata.
23347. Anthephora hermaphrodita.
23349. Panicum barbinode.
23359. Trichachne insularis.
23377. Digitaria sanguinalis.
23392. Cenchrus viridis.
23395. Paspalum paniculatum.
23429. Trichachne insularis.
23433. Cenchrus viridis.

STANDLEY, PAUL C.—Continued

23486. Oplismenus burmanni.
23487. Eragrostis limbata.
23488. Panicum trichoides.
23492. Anthephora hermaphrodita.
23516. Paspalum paniculatum.
23559. Paspalum adoperiens.
23560. Andropogon condensatus.
23568. Paspalum paniculatum.
23575. Cenchrus echinatus.
23576. Arundo donax.
23587. Aristida ternipes.
23596. Paspalum adoperiens.
23605. Paspalum plicatulum.
23607. Paspalum plicatulum.
23609. Ixophorus unisetus.
23637. Tripsacum laxum.
23646. Bambusa nana.
23649. Paspalum paniculatum.
23650. Paspalum plicatulum.
23655. Paspalum notatum.
23693. Panicum sellowii.
23709. Panicum pulchellum.
23712. Lasiacis sorghoidea.
23752. Panicum laxum.
23759. Trichachne insularis.
23793. Oplismenus hirtellus.
23795. Cenchrus viridis.
23797. Digitaria horizontalis.
23798. Paspalum conjugatum pubescens.
23799. Anthephora hermaphrodita.
23806. Eleusine indica.
23807. Echinochloa colonum.
23810. Leptochloa virgata.
23840. Paspalum paniculatum.
23841. Paspalum virgatum.
23860. Paspalum plicatulum.
23861. Panicum pilosum.
23862. Paspalum decumbens.
23864. Eragrostis hypnoides.
23885. Paspalum conjugatum.
23895. Panicum sellowii.
23897. Panicum viscidellum.
23898. Thrasya campylostachya.
23905. Paspalum decumbens.
23957. Panicum trichoides.
23958. Setaria geniculata.
23963. Paspalum paniculatum.
23972. Andropogon condensatus.
23978. Paspalum paniculatum.
24017. Homolepis aturensis.

STANDLEY, PAUL C.—Continued

24021. Eragrostis tephrosanthos.
24035. Guadua aculeata.
24065. Sporobolus elongatus.
24115. Ixophorus unisetus.
24120. Panicum maximum.
24122. Lasiacis oaxacensis.
24131. Paspalum virgatum.
24187. Paspalum decumbens.
24220. Thrasya campylostachya.
24224. Imperata brasiliensis.
24244. Lasiacis procerrima.
24246. Panicum pulchellum.
24256. Tripsacum laxum.
24263. Eriochrysis cayennensis.
24264. Oryza latifolia.
24269. Cynodon dactylon.
24331. Eragrostis ciliaris.
24343. Dactyloctenium aegyptium.
24361. Eragrostis hypnoides.
24371. Sporobolus elongatus.
24372. Echinochloa colonum.
24373. Echinochloa crusgalli crus-pavonis.
24376. Tricholaena rosea.
24402. Setaria geniculata.
24405. Digitaria sanguinalis.
24415. Eragrostis cilianensis.
24416. Eragrostis limbata.
24486. Panicum laxum.
24520. Leptochloa virgata.
24564. Eriochloa punctata.
24565. Arundinella deppeana.
24569. Echinochloa colonum.
24572. Andropogon bicornis.
24577. Panicum trichoides.
24617. Paspalum paniculatum.
24623. Panicum laxum.
24630. Leptochloa virgata.
24636. Panicum trichanthum.
24642. Eragrostis hypnoides.
24649. Paspalum paniculatum.
24649a. Axonopus compressus.
24672. Oplismenus hirtellus.
24676. Olyra latifolia.
24713. Eleusine indica.
24714. Eragrostis tephrosanthos.
24719. Paspalum virgatum.
24724. Paspalum conjugatum.
24725. Homolepis aturensis.
24726. Paspalum decumbens.
24736. Panicum pilosum.

STANDLEY, PAUL C.—Continued

24753. Ichnanthus axillaris.
24761. Chloris radiata.
24766. Ixophorus unisetus.
24771. Panicum hirticaule.
24774. Dactyloctenium aegyptium.
24778. Echinochloa colonum.
24781. Panicum maximum.
24782. Paspalum plicatulum.
24786. Setaria geniculata.
24789. Paspalum paniculatum.
24796. Cynodon dactylon.
24800. Eriochloa punctata.
24803. Digitaria horizontalis.
24813. Olyra latifolia.
24815. Orthoclada laxa.
24853. Panicum trichoides.
24872. Digitaria horizontalis.
24885. Panicum fasciculatum.
24889. Lasiacis divaricata.
24898. Lasiacis divaricata.
24904. Andropogon bicornis.
24912. Cenchrus viridis.
24914. Paspalum plicatulum.
24926. Orthoclada laxa.
24928. Anthephora hermaphrodita.
24941. Panicum trichanthum.
24944. Cenchrus echinatus.
24952. Oplismenus hirtellus.
24978. Homolepis aturensis.
24997. Trichachne insularis.
25045. Lasiacis procerrima.
25065. Lasiacis divaricata.
25130. Paspalum arundinaceum.
25137. Sporobolus littoralis.
25138. Paspalum vaginatum.
25144. Sporobolus elongatus.
25148. Panicum laxum.
25149. Paspalum plicatulum.
25176. Pharus latifolius.
25198. Trachypogon montufari.
25199. Axonopus chrysoblepharis.
25205. Paspalum pilosum.
25210. Aristida jorullensis.
25236. Panicum fasciculatum.
25238. Pennisetum setosum.
25247. Panicum fasciculatum.
25248. Oplismenus burmanni.
25251. Leptochloa virgata.
25258. Lasiacis ruscifolia.
25264. Andropogon condylotrichus.
25265. Paspalum plicatulum.

STANDLEY, PAUL C.—Continued

25269. Aristida ternipes.
25277. Panicum hirticaule.
25288. Hackelochloa granularis.
25292. Paspalum microstachyum.
25298. Panicum trichoides.
25302. Lasiacis ruscifolia.
25360. Bouteloua americana.
25366. Eragrostis maypurensis.
25376. Cenchrus echinatus.
25381. Chloris inflata.
25437. Olyra latifolia.
25438. Lasiacis ruscifolia.
25440. Panicum zizanioides.
25445. Paspalum nutans.
25451. Oplismenus burmanni.
25452. Lasiacis sorghoidea.
25462. Paspalum paniculatum.
25477. Coix lacryma-jobi.
25493. Digitaria sanguinalis.
25519. Paspalum paniculatum.
25541. Panicum maximum.
25549. Panicum maximum.
25584. Chloris radiata.
25608. Ichnanthus tenuis.
25620. Eragrostis tephrosanthos.
25621. Eragrostis amabilis.
25623. Chloris virgata.
25629. Andropogon bicornis.
25631. Panicum geminatum.
25633. Imperata contracta.
25635. Echinochloa colonum.
25640. Saccharum officinarum.
25650. Axonopus compressus.
25651. Paspalum conjugatum.
25652. Andropogon leucostachyus.
25666. Andropogon bicornis.
25674. Ichnanthus pallens.
25675. Panicum pilosum.
25702. Axonopus compressus.
25712. Oplismenus hirtellus.
25775. Lasiacis sorghoidea.
25785. Arthrostylidium racemiflorum.
25813. Paspalum paniculatum.
25832. Aristida jorullensis.
25843. Bouteloua pilosa.
25844. Bouteloua americana.
25864. Bouteloua repens.
25901. Paspalum plicatulum.
25908. Sporobolus ciliatus.
25943. Isachne polygonoides.
25954. Setaria barbata.

STANDLEY, PAUL C.—Continued

25955. Lasiacis sorghoidea.
25985. Chusquea simpliciflora.
25987. Lasiacis sorghoidea.
25995. Panicum laxum.
25997. Paspalum paniculatum.
26001. Lasiacis sorghoidea.
26009. Lasiacis oaxacensis.
26010. Oplismenus hirtellus.
26029. Ischaemum rugosum.
26032. Panicum barbinode.
26049. Paspalum nutans.
26055. Lasiacis procerrima.
26059. Setaria vulpiseta.
26065. Lasiacis sorghoidea.
26077. Lasiacis ruscifolia.
26096. Andropogon condensatus.
26105. Paspalum microstachyum.
26106. Trichachne insularis.
26112. Eragrostis ciliaris.
26113. Paspalum plicatulum.
26114. Paspalum paniculatum.
26123. Chusquea simpliciflora.
26144. Ichnanthus axillaris.
26154. Panicum trichanthum.
26266. Aristida jorullensis.
26267. Eragrostis maypurensis.
26316. Sporobolus indicus.
26317. Panicum pilosum.
26323. Cenchrus viridis.
26338. Paspalum virgatum.
26347. Aristida recurvata.
26348. Trachypogon montufari.
26355. Paspalum minus.
26356. Andropogon semiberbis.
26359. Setaria geniculata.
26383. Ichnanthus tenuis.
26397. Ichnanthus pallens.
26403. Eleusine indica.
26406. Aristida ternipes.
26416. Leptochloa filiformis.
26422. Bouteloua pilosa.
26423. Andropogon condylotrichus.
26429. Pennisetum setosum.
26430. Tripsacum dactyloides.
26438. Hackelochloa granularis.
26444. Digitaria argillacea.
26446. Andropogon brevifolius.
26459. Leptochloa virgata.
26461. Chloris radiata.
26463. Paspalum conjugatum.
26467. Sorghum vulgare.

STANDLEY, PAUL C.—Continued

26471. Paspalum paniculatum.
26476. Axonopus compressus.
26494. Hymenachne donacifolia.
26497. Aristida capillacea.
26504. Axonopus purpusii.
26513. Homolepis aturensis.
26517. Panicum grande.
26522. Andropogon leucostachyus.
26538. Oplismenus burmanni.
26554. Panicum pulchellum.
26569. Isachne polygonoides.
26572. Arthrostylidium racemiflorum.
26605. Sorghastrum incompletum.
26613. Eriochloa distachya.
26614. Diectomis fastigiata.
26624. Sacciolepis myuros.
26633. Andropogon brevifolius.
26635. Aristida jorullensis.
26643. Andropogon bicornis.
26645. Eragrostis maypurensis.
26651. Lasiacis sorghoidea.
26663. Panicum laxum.
26679. Panicum trichanthum.
26682. Panicum stoloniferum.
26694. Pharus latifolius.
26775. Bouteloua pilosa.
26780. Lasiacis sorghoidea.
26796. Paspalum centrale.
26799. Aristida jorullensis.
26804. Andropogon condensatus.
26805. Diectomis fastigiata.
26820. Paspalum paniculatum.
26874. Paspalum plicatulum.
26882. Paspalum virgatum.
26886. Sporobolus ciliatus.
26890. Lasiacis ruscifolia.
26903. Echinochloa colonum.
26914. Ischaemum rugosum.
26917. Sporobolus indicus.
26958. Setaria vulpiseta.
26966. Paspalum paniculatum.
26980. Ischaemum ciliare.
26987. Bambusa vulgaris.
27017. Lasiacis ruscifolia.
27027. Panicum fasciculatum.
27028. Panicum trichoides.
27055. Lasiacis procerrima.
27080. Oplismenus burmanni.
17083. Paspalum microstachyum.
27151. Uniola pittieri.
27252. Panicum trichoides.

STANDLEY, PAUL C.—Continued

27264. Dactyloctenium aegyptium.
27314. Paspalum paniculatum.
27318. Chloris radiata.
27319. Eragrostis tephrosanthos.
27326. Chloris inflata.
27328. Paspalum paniculatum.
27329. Ischaemum rugosum.
27339. Chusquea simpliciflora.
27380. Andropogon condensatus.
27395. Andropogon brevifolius.
27400. Echinochloa crusgalli crus-pavonis.
27402. Andropogon leucostachyus.
27406. Cenchrus viridis.
27407. Panicum hirticaule.
27408. Cynodon dactylon.
27410. Lasiacis oaxacensis.
27430. Pharus latifolius.
27433. Chusquea simpliciflora.
27480. Streptogyne crinita.
27489. Streptochaeta spicata.
27528. Ichnanthus pallens.
27533. Olyra latifolia.
27535. Panicum pilosum.
27569. Oplismenus hirtellus.
27644. Imperata contracta.
27648. Echinochloa colonum.
27649. Cenchrus echinatus.
27652. Eragrostis tephrosanthos.
27654. Panicum barbinode.
27660. Setaria vulpiseta.
27673. Echinochloa colonum.
27688. Dactyloctenium aegyptium.
27694. Sporobolus indicus.
27731. Aristida capillacea.
27732. Sporobolus ciliatus.
27762. Axonopus purpusii.
27782. Paspalum centrale.
27802. Sacciolepis myuros.
27803. Leersia hexandra.
27870. Lasiacis ruscifolia.
27873. Cenchrus viridis.
27874. Ichnanthus pallens.
27895. Panicum pilosum.
27909. Panicum fasciculatum.
27927. Setaria vulpiseta.
27953. Paspalum paniculatum.
27954. Digitaria horizontalis.
27958. Leptochloa filiformis.
27959. Leptochloa virgata.
27960. Panicum hirticaule.

STANDLEY, PAUL C.—Continued

28007. Axonopus aureus.
28008. Trachypogon montufari.
28019. Diectomis fastigiata.
28038. Chusquea simpliciflora.
28050. Oplismenus burmanni.
28068. Andropogon bicornis.
28092. Pharus latifolius.
28142. Lasiacis sorghoidea.
28146. Ichnanthus axillaris.
28165. Eragrostis maypurensis.
28188. Aristida capillacea.
28224. Isachne polygonoides.
28320. Lasiacis sorghoidea.
28339. Paspalum plicatulum.
28341. Chloris inflata.
28350. Chloris radiata.
28354. Paspalum paniculatum.
28362. Andropogon brevifolius.
28367. Chusquea simpliciflora.
28434. Panicum trichoides.
28444. Panicum hirsutum.
28456. Paspalum virgatum.
28469. Andropogon bicornis.
28482. Paspalum repens.
28485. Axonopus compressus.
28486. Anthephora hermaphrodita.
28489. Eragrostis amabilis.
28490. Panicum maximum.
28495. Panicum grande.
28504. Digitaria sanguinalis.
28512. Oplismenus burmanni.
28528. Echinochloa colonum.
28529. Leptochloa virgata.
28534. Panicum laxum.
28535. Lasiacis oaxacensis.
28580. Chloris radiata.
28583. Paspalum fimbriatum.
28584. Paspalum conjugatum.
28587. Ischaemum rugosum.
28598. Panicum rudgei.
28600. Paspalum plicatulum.
28611. Panicum trichoides.
28612. Panicum pilosum.
28617. Paspalum paniculatum.
28663. Ichnanthus pallens.
28711. Andropogon condensatus.
28726. Oryza latifolia.
28783. Paspalum paniculatum.
28794. Andropogon brevifolius.
28799. Eragrostis maypurensis.
28806. Setaria geniculata.

STANDLEY, PAUL C.—Continued

28824. Panicum pulchellum.
28841. Lasiacis sorghoidea.
28849. Eragrostis amabilis.
28905. Sacciolepis myuros.
28979. Paspalum plicatulum.
28985. Leersia hexandra.
28991. Isachne polygonoides.
29024. Arundinella deppeana.
29036. Sorghastrum incompletum.
29062. Chusquea simpliciflora.
29072. Sorghastrum incompletum.
29094. Paspalum plicatulum.
29096. Eragrostis maypurensis.
29097. Ischaemum rugosum.
29098. Panicum laxum.
29115. Panicum fasciculatum.
29124. Paspalum plicatulum.
29130. Isachne polygonoides.
29142. Paspalum microstachyum.
29145. Setaria vulpiseta.
29154. Aristida jorullensis.
29155. Bouteloua repens.
29157. Andropogon angustatus.
29157a. Diectomis fastigiata.
29253. Panicum zizanioides.
29263. Oplismenus hirtellus.
29288. Ichnanthus pallens.
29299. Paspalum decumbens.
29310. Setaria vulpiseta.
29318. Lasiacis ruscifolia.
29319. Lasiacis sorghoidea.
29392. Andropogon angustatus.
29393. Bouteloua pilosa.
29394. Sorghastrum incompletum.
29395. Eragrostis maypurensis.
29396. Aristida jorullensis.
29397. Paspalum centrale.
29398. Eriochloa distachya.
29418. Muhlenbergia tenuissima.
29441. Ichnanthus tenuis.
29488. Echinochloa colonum.
29498. Oplismenus hirtellus.
29523. Lasiacis sorghoidea.
29548. Digitaria horizontalis.
29551. Panicum pilosum.
29552. Echinochloa colonum.
29579. Coix lacryma-jobi.
29628. Panicum pulchellum.
29687. Sporobolus indicus.
29705. Paspalum plicatulum.
29720. Lasiacis sorghoidea.

STANDLEY, PAUL C.—Continued

29751. Aristida capillacea.
29777. Lasiacis sorghoidea.
29895. Chusquea simpliciflora.
29904. Oryza sativa.
29923. Orthoclada laxa.
29929. Oplismenus hirtellus.
29937. Olyra latifolia.
29974. Orthoclada laxa.
30000. Paspalum plicatulum.
30038. Arundinella deppeana.
30058. Setaria vulpiseta.
30062. Paspalum paniculatum.
30063. Paspalum conjugatum.
30071. Homolepis aturensis.
30078. Eleusine indica.
30080. Eragrostis tephrosanthos.
30082. Chloris radiata.
30083. Eragrostis amabilis.
30087. Cynodon dactylon.
30088. Echinochloa colonum.
30092. Digitaria sanguinalis.
30100. Lasiacis procerrima.
30118. Andropogon selloanus.
30124. Digitaria horizontalis.
30125. Trichachne insularis.
30128. Sorghum halepense.
30129. Sorghum vulgare.
30136. Panicum fasciculatum.
30140. Polytrias amaura.
30147. Panicum pilosum.
30153. Lasiacis sorghoidea.
30154. Ichnanthus pallens.
30166. Cymbopogon citratus.
30175. Ichnanthus pallens.
30176. Panicum pulchellum.
30216. Panicum polygonatum.
30217. Ichnanthus pallens.
30230. Lasiacis oaxacensis.
30255. Panicum trichoides.
30257. Chusquea simpliciflora.
30271. Eragrostis hypnoides.
30274. Paspalum decumbens.
30313. Panicum pilosum.
30391. Panicum grande.
30392. Homolepis aturensis.
30413. Axonopus compressus.
30421. Andropogon condensatus.
30428. Andropogon leucostachyus.
30432. Paspalum orbiculatum.
30447. Oryza latifolia.
30543. Paspalum standleyi.

STANDLEY, PAUL C.—Continued

30576. Orthoclada laxa.
30591. Lasiacis oaxacensis.
30607. Olyra latifolia.
30617. Pharus latifolius.
30620. Digitaria horizontalis.
30629. Oryza sativa.
30747. Sacciolepis myuros.
30752. Paspalum centrale.
30754. Isachne polygonoides.
30783. Diectomis fastigiata.
30799. Paspalum vaginatum.
30807. Lasiacis ruscifolia.
30808. Lasiacis sorghoidea.
30809. Lasiacis ruscifolia.
30871. Ischaemum ciliare.
30875. Cenchrus echinatus.
30876. Echinochloa crusgalli crus-pavonis.
30877. Panicum geminatum.
30881. Paspalum vaginatum.
30893. Echinochloa colonum.
30900. Eragrostis tephrosanthos.
30926. Leptochloa virgata.
30997. Homolepis aturensis.
31045. Panicum pulchellum.
31046. Oplismenus burmanni.
31061. Panicum pilosum.
31108. Orthoclada laxa.
31126. Ichnanthus axillaris.
31181. Sporobolus littoralis.
31193. Chloris petraea.
31202. Paspalum paniculatum.
31207. Gynerium sagittatum.
31228. Andropogon glomeratus.
31229. Imperata contracta.
31244. Cenchrus viridis.
31251. Oplismenus hirtellus.
31259. Pharus latifolius.
31335. Olyra latifolia.
31340. Orthoclada laxa.
31344. Arthrostylidium racemiflorum.
31350. Ichnanthus pallens.
31374. Streptochaeta sodiroana.
31464. Paspalum repens.
31465. Hymenachne amplexicaulis.
31468. Coix lacryma-jobi.
31475. Echinochloa colonum.
31476. Eragrostis tephrosanthos.
31477. Panicum trichanthum.
31486. Leptochloa virgata.
31497. Andropogon selloanus.

STANDLEY, PAUL C.—Continued

31508. Paspalum paniculatum.
31509. Ischaemum rugosum.
31510. Panicum laxum.
31512. Eragrostis amabilis.
31529. Paspalum paniculatum.
31537. Echinochloa colonum.
31558. Homolepis aturensis.
31570. Andropogon condensatus.
31577. Eragrostis ciliaris.
31582. Panicum barbinode.
31609. Lasiacis oaxacensis.
31620. Chloris inflata.
31625. Panicum trichoides.
31636. Oplismenus burmanni.
31637. Panicum pulchellum.
31639. Orthoclada laxa.
31652. Panicum fasciculatum.
31662. Paspalum decumbens.
31669. Chusquea simpliciflora.
31730. Orthoclada laxa.
31734. Setaria vulpiseta.
31751. Panicum pulchellum.
31765. Panicum pilosum.
31771. Ichnanthus tenuis.
31776. Digitaria horizontalis.
31784. Paspalum virgatum.
31788. Chloris radiata.
31837. Lasiacis sorghoidea.
31850. Sorghastrum incompletum.
31858. Aristida jorullensis.
31859. Eragrostis maypurensis.
31860. Diectomis fastigiata.
31861. Eriochloa distachya.
31983. Sacciolepis myuros.
32019. Eragrostis acutiflora.
32022. Lasiacis sorghoidea.
32080. Andropogon angustatus.
32099. Paspalum plicatulum.
32134. Lasiacis ruscifolia.
32232. Panicum pulchellum.
32267. Paspalum paniculatum.
32268. Paspalum candidum.
32288. Muhlenbergia tenella.
32371. Tricholaena rosea.
32400. Oplismenus hirtellus.
32454. Oplismenus burmanni.
32464. Sporobolus elongatus.
32477. Oplismenus hirtellus.
32486. Muhlenbergia tenella.
32564. Andropogon glomeratus.
32568. Bouteloua alamosana.

STANDLEY, PAUL C.—Continued

32571. Stipa ichu.
32594. Zeugites mexicana.
32595. Panicum virgultorum.
32596. Sporobolus elongatus.
32599. Paspalum squamulatum.
32657. Chaetium bromoides.
32715. Andropogon brevifolius.
32731. Andropogon glomeratus.
32765. Eragrostis limbata.
32779. Paspalum candidum.
32804. Sporobolus elongatus.
32813. Chaetium bromoides.
32816. Muhlenbergia tenella.
32817. Chloris othonoton.
32855. Poa annua.
32865. Paspalum costaricense.
32870. Eragrostis limbata.
32876. Paspalum paniculatum.
32881. Eragrostis ciliaris.
32909. Poa annua.
32926. Sporobolus elongatus.
32927. Axonopus compressus.
33006. Muhlenbergia setarioides.
33075. Ichnanthus nemorosus.
33187. Paspalum squamulatum.
33269. Poa annua.
33285. Cynodon dactylon.
33289. Paspalum paniculatum.
33292. Paspalum squamulatum.
33365. Lasiacis sorghoidea.
33450. Ichnanthus nemorosus.
33581. Lasiacis sorghoidea.
33643. Arthrostylidium maxoni.
33666. Holcus lanatus.
33812. Arthrostylidium maxoni.
33853. Ichnanthus pallens.
33870. Panicum viscidellum.
33878. Olyra standleyi.
33989. Lasiacis sorghoidea.
34048. Panicum olivaceum.
34062. Pennisetum bambusiforme.
34078. Panicum viscidellum.
34166. Panicum virgultorum.
34211. Paspalum squamulatum.
34219. Oplismenus hirtellus.
34303. Ichnanthus nemorosus.
34502. Muhlenbergia setarioides.
34600. Panicum olivaceum.
34607. Holcus lanatus.
34609. Lolium perenne.
34618. Polypogon elongatus.

STANDLEY, PAUL C.—Continued

34702. Chusquea pittieri.
34789. Pennisetum distachyum.
34849. Agrostis pittieri.
34863. Chusquea lehmannii.
34875. Anthoxanthum odoratum.
34885. Poa annua.
34941. Poa annua.
34970. Festuca rubra.
35016. Lolium perenne.
35019. Trisetum irazuense.
35037. Agrostis turrialbae.
35073. Holcus lanatus.
35074. Anthoxanthum odoratum.
35081. Lolium perenne.
35094. Poa annua.
35164. Festuca elatior.
35169. Poa pratensis.
35171. Trisetum irazuense.
35180. Paspalum dilatatum.
35208. Agrostis turrialbae.
35274. Trisetum irazuense.
35326. Poa pratensis.
35336. Agrostis turrialbae.
35372. Agrostis stolonifera.
35444. Bromus laciniatus.
35484. Andropogon ischaemum.
35865. Eragrostis limbata.
35924. Pennisetum bambusiforme.
35949. Arundinella berteroniana.
35968. Trichachne pittieri.
36049. Tricholaena rosea.
36146. Isachne arundinacea.
36702. Paspalum paniculatum.
36710. Oplismenus burmanni.
36711. Panicum polygonatum.
36786. Orthoclada laxa.
36809. Streptochaeta sodiroana.
36977. Orthoclada laxa.
36990. Pharus latifolius.
37003. Paspalum paniculatum.
37006. Axonopus compressus.
37050. Pharus cornutus.
37178. Lasiacis scabrior.
37195. Pharus cornutus.
37276. Ichnanthus axillaris.
37288. Paspalum minus.
37386. Pennisetum purpurascens.
37389. Ixophorus unisetus.
37575. Arundinella berteroniana.
38371. Poa annua.
38398. Trisetum viride.

STANDLEY, PAUL C.—Continued

38433. Lolium perenne.
38434. Holcus lanatus.
38717. Sporobolus elongatus.
38758. Agrostis stolonifera.
38763. Chusquea lehmannii.
38813. Poa annua.
38865. Anthoxanthum odoratum.
38976. Muhlenbergia setarioides.
38998. Lasiacis sorghoidea.
39006. Leersia grandiflora.
39012. Pennisetum distachyum.
39015. Chloris radiata.
39016. Paspalum candidum.
39017. Brachiaria plantaginea.
39018. Paspalum paniculatum.
39030. Eragrostis tephrosanthos.
39040. Isachne arundinacea.
39041. Panicum xalapense.
39042. Panicum glutinosum.
39043. Panicum viscidellum.
39096. Arthrostylidium maxoni.
39105. Arthrostylidium maxoni.
39149. Axonopus scoparius.
39179. Arthrostylidium maxoni.
39215. Lasiacis sorghoidea.
39267. Panicum olivaceum.
39320. Panicum olivaceum.
39332. Isachne arundinacea.
39394. Panicum xalapense.
39411. Arthrostylidium maxoni.
39413. Panicum olivaceum.
39637. Pharus glaber.
39648. Lasiacis sorghoidea.
39709. Pharus parvifolius.
40099. Eragrostis tephrosanthos.
40776. Andropogon semiberbis.
40805. Ichnanthus nemorosus.
40830. Panicum pilosum.
40837. Lasiacis sorghoidea.
40838. Axonopus compressus.
40920. Pharus latifolius.
40951. Ischaemum rugosum.
40953. Paspalum paniculatum.
41024. Ichnanthus nemorosus.
41084. Streptochaeta sodiroana.
41114. Andropogon condensatus.
41124. Polytrias amaurea.
41125. Chloris radiata.
41159. Streptogyne crinita.
41172. Setaria vulpiseta.
41183. Hackelochloa granularis.

STANDLEY, PAUL C.—Continued

41243. Muhlenbergia tenella.
41256. Paspalum candidum.
41278. Paspalum costaricense.
41283. Chloris radiata.
41296. Lasiacis sorghoidea.
41337. Panicum sphaerocarpon.
41350. Lasiacis sorghoidea.
41352. Muhlenbergia diversiglumis.
41483. Panicum cordovense.
41551. Pereilema crinitum.
41552. Tripsacum laxum.
41575. Panicum helobium.
41582. Panicum glutinosum.
41583. Paspalum squamulatum.
41586. Muhlenbergia implicata.
41603. Oplismenus burmanni.
41606. Paspalum candidum.
41608. Muhlenbergia implicata.
41612. Tricholaena rosea.
41613. Panicum xalapense.
41620. Oplismenus hirtellus.
41665. Lasiacis sorghoidea.
41683. Oplismenus hirtellus.
41684. Zeugites mexicana.
41720. Aegopogon tenellus.
41769. Pereilema crinitum.
41771. Ischaemum latifolium.
41825. Chusquea pittieri.
41831. Muhlenbergia diversiglumis.
41944. Arundinaria viscosa.
41957. Ichnanthus nemorosus.
41984. Holcus lanatus.
42230. Poa annua.
42323. Cortaderia nitida.
42386. Oplismenus hirtellus.
42422. Arundinella deppeana.
42459. Chaetium bromoides.
42473. Chusquea pittieri.
42488. Paspalum convexum.
42531. Lasiacis rhizophora.
42552. Aegopogon cenchroides.
42623. Dactylis glomerata.
42853. Melinis minutiflora.
42854. Pennisetum purpurascens.
42908. Ichnanthus nemorosus.
42911. Chusquea pittieri.
43186. Polypogon elongatus.
43214. Paspalum candidum.
43215. Muhlenbergia diversiglumis.
43216. Arundinella deppeana.
43218. Muhlenbergia implicata.

STANDLEY, PAUL C.—Continued

43224. Pereilema crinitum.
43264. Lasiacis rhizophora.
43377. Panicum olivaceum.
43427. Eragrostis lugens.
43430. Andropogon hirtiflorus.
43476. Lasiacis sorghoidea.
43511. Cinna poaeformis.
43601. Agrostis turrialbae.
43619. Agrostis tolucensis.
43620. Chusquea subtessellata.
43625. Agrostis bacillata.
43628. Trisetum pringlei.
43678. Agrostis bacillata.
43741. Cinna poaeformis.
43815. Poa annua.
43852. Agrostis tolucensis.
43904. Chusquea serrulata.
43995. Pennisetum bambusiforme.
44045. Ischaemum latifolium.
44066. Pereilema crinitum.
44070. Ichnanthus nemorosus.
44071. Lasiacis rhizophora.
44221. Trichachne insularis.
44236. Lasiacis rhizophora.
44512. Ichnanthus pallens.
44517. Melinis minutiflora.
44523. Lasiacis oaxacensis.
44587. Pharus parvifolius.
44888. Lasiacis ruscifolia.
44963. Imperata contracta.
44964. Ixophorus unisetus.
44976. Pharus latifolius.
45024. Paspalum paniculatum.
45151. Lasiacis oaxacensis.
45386. Setaria paniculifera.
45498. Lasiacis ruscifolia.
45532. Lasiacis standleyi.
45536. Oplismenus hirtellus.
45664. Arthrostylidium racemiflorum.
45820. Lasiacis standleyi.
45839. Lasiacis standleyi.
45848. Ichnanthus nemorosus.
45897. Lasiacis scabrior.
46140. Lasiacis standleyi.
46451. Olyra latifolia.
46552. Anthephora hermaphrodita.
46554. Paspalum paniculatum.
46695. Lasiacis ruscifolia.
46755. Paspalum decumbens.
46763. Pseudechinolaena polystachya.
46876. Lasiacis ruscifolia.

STANDLEY, PAUL C.—Continued

47060. Lasiacis ruscifolia.
47069. Panicum pulchellum.
47076a. Arundinella deppeana.
47117. Lasiacis scabrior.
47133. Olyra latifolia.
47160. Lasiacis standleyi.
47168. Lasiacis sorghoidea.
47324. Lasiacis sorghoidea.
47328. Lasiacis sorghoidea.
47409. Arundinella berteroniana.
47507. Lasiacis scabrior.
47709. Paspalum nutans.
47833. Holcus lanatus.
47838. Paspalum candidum.
47903. Oplismenus hirtellus.
48228. Poa annua.
48525. Pharus latifolius.
48597. Orthoclada laxa.
48661. Raddia concinna.
48682. Homolepis aturensis.
48758. Pharus glaber.
48783. Raddia concinna.
48798. Pariana zingiberina.
48854. Raddia concinna.
49311. Coix lacryma-jobi.
49448. Lasiacis sorghoidea.
49473. Briza minor.
49592. Polypogon elongatus.
49627. Poa annua.
49710. Ichnanthus pallens.
49763. Oplismenus burmanni.
49781. Arthrostylidium maxoni.
49785. Lasiacis standleyi.
49966. Polypogon elongatus.
50001. Polypogon elongatus.
50012. Paspalum squamulatum.
50018. Paspalum candidum.
50068. Lasiacis standleyi.
50626. Paspalum candidum.
50661. Axonopus purpusii.
50897. Arundinaria standleyi.
50932. Olyra standleyi.
50977. Ichnanthus pallens.
50979. Lasiacis standleyi.
50981. Arthrostylidium maxoni.
51060. Arundinaria standleyi.
51199. Pharus parvifolius.
51689. Arundinella berteroniana.
52618. Pharus glaber.
52707. Olyra latifolia.
52742. Panicum trichoides.

STANDLEY, PAUL C.—Continued

52784. Lithachne pauciflora.
52803. Lasiacis ruscifolia.
52831. Paspalum paniculatum.
52837. Paspalum microstachyum.
52841. Panicum barbinode.
52845. Oryza latifolia.
52852. Setaria paniculifera.
52864. Panicum fasciculatum.
52865. Eleusine indica.
52876. Streptochaeta sodiroana.
52891. Ixophorus unisetus.
52937. Olyra latifolia.
52957. Eragrostis tephrosanthos.
52968. Ichnanthus axillaris.
52999. Anthephora hermaphrodita.
53002. Cenchrus pauciflorus.
53020. Cenchrus echinatus.
53027. Eragrostis ciliaris.
53039. Paspalum ciliatifolium.
53048. Digitaria horizontalis.
53051. Stenotaphrum secundatum.
53062. Panicum trichanthum.
53068. Coix lacryma-jobi.
53076. Ichnanthus pallens.
53092. Lasiacis divaricata.
53139. Streptochaeta sodiroana.
53161. Paspalum microstachyum
53166. Guadua aculeata.
53167. Leptochloa virgata.
53168. Axonopus compressus.
53171. Chloris radiata.
53180. Panicum polygonatum.
53181. Panicum polygonatum.
53253. Paspalum orbiculatum.
53273. Lasiacis ruscifolia.
53277. Pseudechinolaena polystachya.
53312. Digitaria sanguinalis.
53313. Trichachne insularis.
53315. Paspalum conjugatum.
53390. Cynodon dactylon.
53391. Digitaria horizontalis.
53410. Eragrostis amabilis.
53423. Setaria geniculata.
53426. Oryza sativa.
53428. Panicum hirsutum.
53440. Eragrostis mexicana.
53453. Saccharum officinarum.
53464. Paspalum propinquum.
53471. Leersia hexandra.
53472. Panicum barbinode.
53473. Phragmites communis.

STANDLEY, PAUL C.—Continued

53474. Panicum grande.
53529. Panicum polygonatum.
53571. Andropogon bicornis.
53585. Panicum laxum.
53591. Paspalum millegrana.
53612. Echinochloa colonum.
53642. Andropogon nodosus.
53643. Melinis minutiflora.
53691. Panicum fasciculatum.
53692. Panicum hirsutum.
53693. Panicum maximum.
53748. Paspalum paniculatum.
53796. Paspalum propinquum.
53805. Sporobolus littoralis.
53820. Andropogon semiberbis.
53830. Chloris petraea.
53910. Lithachne pauciflora.
53914. Panicum trichanthum.
53933. Panicum fasciculatum.
54014. Digitaria horizontalis.
54035. Panicum laxum.
54041. Panicum pilosum.
54074. Ichnanthus pallens.
54082. Guadua aculeata.
54087. Eleusine indica.
54110. Pseudechinolaena polystachya.
54131. Olyra latifolia.
54180. Streptochaeta sodiroana.
54231. Paspalum propinquum.
54248. Dactyloctenium aegyptium.
54282. Lasiacis divaricata.
54297. Coix lacryma-jobi.
54298. Leptochloa virgata.
54311. Oplismenus hirtellus.
54473. Panicum stagnatile.
54484. Paspalum notatum.
54488. Pseudechinolaena polystachya.
54507. Oplismenus hirtellus.
54508. Ichnanthus pallens.
54513. Panicum maximum.
54543. Lasiacis oaxacensis.
54544. Lithachne pauciflora.
54545. Lasiacis divaricata.
54553. Lasiacis ruscifolia.
54557. Ichnanthus pallens.
54701. Panicum cayennense.
54704. Cymbopogon citratus.
54707. Cenchrus echinatus.
54779. Lasiacis ruscifolia.
54784. Paspalum microstachyum.
54913. Setaria paniculifera.

STANDLEY, PAUL C.—Continued

54939. Digitaria sanguinalis.
54941. Tripsacum laxum.
54946. Chloris radiata.
54965. Leptochloa virgata.
Leptochloa filiformis.
54971. Panicum trichanthum.
55051. Leptochloa filiformis.
55116. Panicum stoloniferum.
55165. Lithachne pauciflora.
55222. Lithachne pauciflora.
55325. Chloris radiata.
55366. Andropogon bicornis.
55416. Streptochaeta sodiroana.
55512. Oplismenus setarius.
55705. Paspalum fasciculatum.
55711. Panicum hirsutum.
55714. Leptochloa filiformis.
55850. Panicum olivaceum.
55851. Paspalum multicaule.
55870. Eragrostis maypurensis.
55871. Aristida capillacea.
55886. Aegopogon cenchroides.
55905. Panicum viscidellum.
55966. Paspalum notatum.
55971. Sacciolepis myuros.
55994. Panicum laxum.
55996. Paspalum stellatum.
55997. Andropogon brevifolius.
56000. Andropogon furcatus.
56004. Panicum aciculare.
56006. Thrasya campylostachya.
56009. Panicum arenicoloides.
56012. Andropogon condensatus.
56017. Thrasya campylostachya.
56028. Paspalum nutans.
56074. Eragrostis lugens.
56077. Aristida virgata.
56120. Hyparrhenia bracteata.
56135. Panicum olivaceum.
56185. Panicum xalapense.
56199. Panicum xalapense.
56207. Ichnanthus standleyi.
56212. Paspalum umbratile.
56214. Aegopogon cenchroides.
56215. Panicum xalapense.
56219. Panicum olivaceum.
56223. Sacciolepis myuros.
56224. Sorghastrum nutans.
56225. Andropogon condensatus.
56246. Paspalum humboldtianum.
56250. Panicum sphaerocarpon.

STANDLEY, PAUL C.—Continued

56256. Sporobolus ciliatus.
56261. Panicum olivaceum.
56262. Eragrostis maypurensis.
56275. Paspalum stellatum.
56287. Chloris virgata.
56306. Arundinella berteroniana.
56308. Sporobolus elongatus.
56311. Axonopus centralis.
56322. Axonopus poiophyllus.
56336. Oplismenus hirtellus.
56338. Oplismenus hirtellus.
56361. Panicum virgultorum.
56363. Thrasya campylostachya.
56367. Ischaemum latifolium.
56385. Panicum haenkeanum.
56386. Ichnanthus pallens.
56398. Hyparrhenia bracteata.
56407. Arundinella deppeana.
56421. Aristida jorullensis.
56452. Aristida capillacea.
56454. Eragrostis maypurensis.
56455. Sporobolus ciliatus.
56499. Andropogon saccharoides laguroides.
56524. Eragrostis limbata.
56576. Paspalum orbiculatum.
56587. Chloris inflata.
56601. Oryza latifolia.
56605. Oplismenus hirtellus.
56642. Panicum laxum.
56737. Paspalum langei.

THIEME, C.

17. Ichnanthus pallens.
31. Lasiacis ruscifolia.
323. Oplismenus hirtellus.
374. Paspalum conjugatum.
376a. Thrasya campylostachya.
534. Heteropogon contortus.
781. Panicum polygonatum.
795. Eragrostis ciliaris.
5573. Pharus latifolius.
5574. Setaria vulpiseta.
5576. Eragrostis ciliaris.
5577. Eragrostis hypnoides.
5578. Panicum polygonatum.
5579. Leersia hexandra.
5580. Cenchrus viridis.
5581. Oplismenus burmanni.
Oplismenus hirtellus.

THIEME, C.—Continued

5582. Setaria vulpiseta.
Pennisetum setosum.
5582B. Setaria tenacissima.
Setaria vulpiseta.
5583. Setaria geniculata.
5584. Panicum fasciculatum.
5585. Lasiacis ruscifolia.
Lasiacis oaxacensis.
5586. Pseudechinolaena polystachya.
5587. Panicum polygonatum.
Digitaria horizontalis.
Panicum laxum.
Axonopus compressus.
Leptochloa filiformis.
Panicum trichanthum.
Panicum pilosum.
5588. Panicum ichnanthoides.
5589. Setaria paniculifera.
5590. Ichnanthus pallens.
5591. Thrasya campylostachya.
5592. Paspalum conjugatum.
5593. Paspalum plicatulum.
5594. Ichnanthus pallens.
Paspalum paniculatum.
5595. Eleusine indica.
5595B. Tripsacum latifolium.
5596. Eleusine indica.
Leptochloa virgata.
5597. Dactyloctenium aegyptium.
5598. Hackelochloa granularis.

TONDUZ, A.

8. Cenchrus echinatus.
12. Panicum trichoides.
27. Panicum polygonatum.
34. Trichachne insularis.
58. Eleusine indica.
61. Olyra latifolia.
117. Eragrostis ciliaris.
119. Tricholaena rosea.
120. Coix lacryma-jobi.
166. Isachne arundinacea.
182. Pharus latifolius.
194. Cenchrus viridis.
213. Setaria geniculata.
224. Oplismenus burmanni.
259. Panicum frondescens.
264. Leptochloa scabra.
266. Panicum hirsutum.
268. Hackelochloa granularis.

TONDUZ, A.—Continued

284. Setaria paniculifera.
302. Eragrostis ciliaris.
Panicum zizanioides.
333. Andropogon bicornis.
363. Panicum trichoides.
565. Jouvea pilosa.
680. Tricholaena rosea.
681. Eragrostis lugens.
682. Andropogon saccharoides laguroides.
683. Paspalum notatum.
685. Paspalum tenellum.
701. Setaria geniculata.
702. Paspalum lividum.
703. Andropogon saccharoides laguroides.
719. Panicum virgultorum.
720. Cynodon dactylon.
750. Paspalum humboldtianum.
766. Setaria geniculata.
769. Paspalum costaricense.
771. Panicum olivaceum.
772. Eragrostis limbata.
773. Leersia hexandra.
821. Panicum maximum.
822. Cenchrus echinatus.
848. Lasiacis sorghoidea.
849. Aristida schiedeana.
850. Lasiacis procerrima.
851. Pennisetum complanatum.
870. Arundinella deppeana.
872. Polypogon elongatus.

TÜRCKHEIM, H. VON

34. Pennisetum bambusiforme.
42. Eriochrysis cayennensis.
56. Panicum sphaerocarpon.
66. Paspalum boscianum.
78. Eleusine indica.
81. Pennisetum complanatum.
87. Isachne arundinacea.
116. Paspalum paniculatum.
117. Setaria geniculata.
161. Paspalum affine.
181. Paspalum fasciculatum.
428. Panicum olivaceum.
438. Oplismenus hirtellus.
440. Paspalum costaricense.
445. Pennisetum complanatum.
459. Paspalum plenum.

TÜRCKHEIM, H. VON—Continued

466. Zeugites mexicana.
468. Aristida adscensionis.
471. Andropogon malacostachyus.
472. Diectomis fastigiata.
473. Oplismenus burmanni.
483. Pharus glaber.
654. Eleusine indica.
655. Sporobolus purpurascens.
Sporobolus elongatus.
656. Eragrostis tephrosanthos.
657. Panicum sellowii.
658. Paspalum costaricense.
715. Lasiacis rhizophora.
820. Panicum tuerckheimii.
845. Olyra latifolia.
907. Poa annua.
908. Ichnanthus pallens.
925. Eragrostis limbata.
951. Paspalum decumbens.
954. Eragrostis hypnoides.
1028. Lasiacis procerrima.
1201. Eragrostis hypnoides.
1209. Luziola peruviana.
1210. Paspalum lividum.
1224. Olyra latifolia.
1251. Agrostis perennans.
1253. Axonopus compressus.
1254. Panicum boliviense.
1255. Homolepis aturensis.
1269. Aegopogon cenchroides.
1287. Echinochloa crusgalli crus-pavonis.
1292. Eragrostis lugens.
1321. Pseudechinolaena polystachya.
1322. Panicum multirameum.
1326. Panicum schiffneri.
1331. Oplismenus setarius.
1342. Panicum biglandulare.
1362. Pereilema crinitum.
1363. Oplismenus burmanni.
1364. Eragrostis limbata.
Eragrostis tephrosanthos.
1416. Pseudechinolaena polystachya.
1450. Setaria paniculifera.
1451. Panicum pilosum.
1452. Paspalum decumbens.
1453. Ichnanthus axillaris.
1457. Panicum tuerckheimii.
1481. Lasiacis ruscifolia.
1509. Pereilema crinitum.
1510. Muhlenbergia diversiglumis.

TÜRCKHEIM, H. VON—Continued

1799. Imperata brasiliensis.
1956. Panicum biglandulare.
1979. Zeugites mexicana.
2136. Pennisetum bambusiforme.
2183. Pennisetum bambusiforme.
2454. Luziola peruviana.
2483. Pseudechinolaena polystachya.
2486. Lasiacis procerrima.
3390. Muhlenbergia implicata.
3771. Eriochrysis cayennensis.
3772. Homolepis aturensis.
3773. Paspalum lentiginosum.
3788. Panicum virgultorum.
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